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The Clinical Department

BY

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IN a previous article (Goodwin, 1959), a need was argued for clinical specialists in the veterinary teaching schools. The development of these specialists, however, must be seen against a wider professional background; for it is clearly unsatisfactory if the general framework within which the individual clinician has to function is moving in a different direction. The purpose of the present discussion, therefore, is to examine the larger organisation—the clinical department within a teaching unit—as it impinges both upon its own and related staffs, and upon other veterinary services outside the universities. As before, the conclusions reached apply in the first instance to veterinary medicine; some of the points might be transferred to veterinary surgery, but to what extent this is so must be left to the surgeons themselves.

The incorporation of the veterinary colleges into the universities has been a major step with many advantages. So major, that there appears to be a tendency to accept the change almost as an end in itself rather than as an immediate opportunity to evolve new concepts in veterinary science. The aim of the pre-clinical teacher, as in physiology, is clear-cut: to advance the status of his subject until it merges imperceptibly with the best standards that are recognised by closely related and parent scientific societies. But the more vocational departments of the veterinary schools cannot so readily be compared with departments elsewhere, and this divergence is greatest at the clinical level. Here a separate philosophy is called for, distinct from human medicine but compatible with the prime purposes of the veterinary profession as these are expressed in the advancement of knowledge and in providing a service to the public. What, then, is the rôle of a department of veterinary medicine in these two contexts—teaching and all that goes with it, and consultation work?

Teaching

Undergraduate teaching

By undergraduate teaching, instruction leading to registration is meant, even though some students will, in fact, be graduates in non-veterinary subjects before this time. Clinical teaching embraces the imparting of both clinical knowledge and practical clinical ability, and it is noteworthy that of all the stages in veterinary education it is this that has hitherto been so conspicuously deficient. Rarely is there such agreement as when this question is broached with graduates, and it appears to be almost universally accepted within the profession that for many years students have passed their final examination in medicine largely on what they had learnt in pathology and elsewhere, as when seeing general practice. Some practical instruction has been given in operative surgery, but in medicine virtually none. Yet it is precisely in these clinical subjects that most graduates find their careers. Not only is it usual for graduates to embark inadequately trained, however, but subsequently there is little provision for further instruction. Such a system is well-designed to perpetuate its failures, and two factors are essential if the required change is to come about. First, a course of instruction that is specifically designed to foster general clinical ability and, secondly, teachers who are experienced and practising clinicians. These two factors will be discussed in turn.

It has just been stated that a low standard of clinical science is innate in a system that does not train its clinicians at either the undergraduate or post-graduate level, and hence this situation will continue for some time until the vicious circle is broken and

it becomes an ascending spiral in which successive generations of teachers train students to increasingly rigorous criteria of competence. As this improvement cannot be achieved at one stroke, a start has to be made somewhere and the current teaching experiment with undergraduate students at Glasgow University calls for comment. There it has been decided that an absolute requirement of the new graduate is the ability to examine an animal, and a real attempt is being made to ensure that this requirement is met. The Glasgow teachers in medicine would not pretend that they have done more than explore a new approach but, by comparison with the past, their achievements are significant. The final examination in medicine includes a separate clinical test in which the student has to examine a number of live animals in detail, describing all he finds. Failure to pass this part of the examination, which lasts for about 3 hours, disqualifies a student completely and the writer remembers well a student hovering on the brink of total failure because he failed to find an ulcer deep at the root of a cow's tongue. There is, of course, more to medicine than the ability to observe, and a balance has to be struck between the examination of the individual and the recognition of larger epidemiological factors, but these two types of clinical appreciation, coupled with the training of the pre-clinical years and an enquiring desire to understand, are the composite essentials of the newly-qualified general practitioner.

Having designed a course so that it encourages the development of the above two types of comprehension —practical skill and clinical knowledge—the necessary teachers must be available. These teachers should themselves be trained and, then, be engaged in regular consultant work. The post-graduate training of the clinical teacher has already been examined in detail (Goodwin, 1959) and the next section also touches upon this subject; at this stage, therefore, only the importance of continuing practical experience need be re-stressed. The small amount of clinical work undertaken by clinical teachers in the past was undoubtedly one of the main reasons for the shortcomings of the medical training, and the emergence of a recognised professional consultant structure through which clinical teachers can be immersed in the problems of practice is a subject that is enlarged upon later.

Post-graduate teaching

In the absence of a post-graduate school of veterinary medicine, serving the whole profession as the Institute of Animal Pathology at Cambridge served it in a different capacity in the past, further clinical instruction rests with the existing clinical departments. It is interesting to note how the practice of post-graduate training diminishes in those sections of the veterinary curriculum closest to the final examination, and one cannot help wondering whether this is not bound up with an all too prevalent attitude that a veterinary surgeon, on graduation, can be the complete master of his subjects. A philosophy that embodies this approach will naturally be averse to further instruction, but it is not only the clinical teachers who have been largely self-trained. In the pathology departments, notably in morbid anatomy, there has likewise been a view that specialised post-graduate instruction need not necessarily precede a teaching appointment. Fortunately, a number of veterinary teachers and research workers now realise the limitations of their own training and are anxious to ensure that the next generation be given a basic and solid apprenticeship in the discipline of their choice.

It is the function of a medical department, therefore, to select and develop embryo clinicians. To this end, it must employ teachers capable of training students well beyond the graduate level and it must also provide a consultant organisation within which ample clinical experience can be gained. Such an organisation requires support of two types: ideological and financial. These latter aspects of the consultant services will be considered next but, before coming to them, there is one topic of post-graduate clinical training that can conveniently be raised now. It concerns the desirability of interposing a period of instruction in general and comparative medicine between graduation and a more specialised clinical career. The extent to which this will be necessary, however, should diminish as the quality of undergraduate teaching improves, and this question could profitably be discussed again in the light of future experience.

Professional Consultant Structure

Ideological considerations

1. *The Need.* The first assumption is that medicine will become more complex. When one considers how little is known about the processes of disease to-day, it is to be hoped that such progress is inevitable. Indeed, one can foresee a situation in the future where the clinical teachers will be forced to re-orientate their whole curriculum. The problems of overloaded education now facing the schoolmasters could well be paralleled in our professional training. That is, how does one cover medicine and surgery of all the species in four or five terms? Until recently, for example, poultry diseases were largely ignored, the profession following the attitude of the teachers of human medicine concerning mental health. Although much of the illness in man is attributable to mental disturbances, the student of human medicine obtains relatively little guidance on the handling of such cases. This situation has been neatly summarised by those critics who say that the medical profession is less concerned with the diseases that people have than the diseases the teachers think they ought to have. Now, therefore, that the poultry industry is such a large component of British agriculture, while the public wish to keep large numbers of cage birds, as well as increasing numbers of mink and chinchillas, it would seem reasonable that the pathology and medicine of all these species should be sufficiently covered in the veterinary courses.

Together with the accumulation of more knowledge on more species, the changing pattern of agriculture towards larger and more intensive units will produce yet further problems, where the need

is for expert broad advice rather than the immediate treatment of individual sick animals. These larger production units of pigs and poultry are already seeking guidance of this kind, guidance that can make a great difference to the annual profit. Can it be expected that the practitioner can cope with all these demands himself and continue to give his clients the best advice available? If the answer to this question is, no, which is the writer's view, then appropriate consultant and advisory services must be established. Certainly, more and more practitioners are making use of such advisory services as there are, and this is more noticeable among the younger graduates. It might be expected, therefore, that there is a movement in this direction that will continue. Its growth will be retarded, however, if the practitioner is not convinced that the advisory staffs have something real to offer, which brings us to the consultant services themselves.

2. *The Service.* It has been emphasised earlier that the clinical teacher must be in constant touch with the problems of practice and it has just been concluded that there will be an increasing demand for advisory services. These two proposals lead to the rôle of the clinical consultant in the profession of the future and his relationship with other organisations. Before continuing with this question, however, it is important to define two terms: "clinical specialist" and "pathologist". Many veterinary discussions become fogged because this is not done; different people mean different things by these words, especially when the equivalents in human medicine can have a different emphasis also.

By the term "clinical specialist" the writer means a person trained and experienced with disease in the whole animal; a person concerned with diagnosis (not only clinical diagnosis, but diagnosis based on all the laboratory information available), treatment, and the behaviour of disease in relation to housing, nutrition and management, both in its scientific and economic aspects. A pathologist in the present context is one trained and experienced in a branch of pathology, which includes chemical pathology, virology, bacteriology, morbid anatomy and parasitology.* As indicated elsewhere, the division between the clinician and the pathologist need not be completely rigid, but there must be some division. If the pathologist concerns himself more with disease in the field than with his science in the laboratory he will, by definition, be a less experienced pathologist. He may become a slightly better clinician but that is not his function and we need better professional pathologists as well as better clinical consultants. There are whole fields such as cellular behaviour in pathological processes and the biology of aetiological agents that await intensive investigation by veterinary pathologists. The work needs doing and only the trained pathologists can do it. It is not the main function of the pathologists, therefore, to advise in the field; their task is to advance the sciences ancillary to medicine and to provide specialised information for the clinician. This does not mean, of course, that they are in any way subservient. There is no question of relative merit involved; each specialist has a part to play in the elucidation of disease and all are necessary to the whole.

This difference between the clinical consultant and the pathologist seems to be a point that is difficult to make in the profession at the moment. The clinician as a practitioner is well recognised and his broad responsibilities in the immediate treatment of disease are apparent to all. Frequently the practitioner needs laboratory assistance and the pathology laboratories supply a great deal of useful information, but one can become mesmerised by laboratory data and see in it too many final answers. There is a stage beyond the laboratory where the bench results have to be related to the patient or the outbreak again, and the evaluation of increasingly complex laboratory findings requires an experience acquainted with the limits of pathological examinations and trained in the interplay of pathological processes. There is a difference, then, between a clinical consultant and a pathologist, even at the research level. The economics and demands of veterinary practice underline this difference even more. The training of the pathologist is fundamentally different from that of the clinician, and if the writer's earlier arguments for species specialisation be accepted, this difference widens yet again. It cannot be too strongly emphasised, however, that the difference is not of quality, as this is understood in the scientific world, but in the type of work performed.

Such a distinction between the clinical specialist and the pathologist has become blurred in the recent past in Britain by the growth of laboratory services and the common assumption that it is only in the laboratory that science can flower. The movement of the pathologist into the clinical field has almost certainly waxed by virtue of the lack of any counterbalancing clinical thought and experience, and by virtue also of false comparisons between human and veterinary clinical medicine. To work with colleagues practising human medicine brings home this striking difference at the clinical level: compared with the veterinary consultant, the consultant in human medicine is working with one hand tied; he is limited in his experimental techniques and is completely denied some knowledge, such as might be obtained from the *post-mortem* examination of cases killed at different stages of a disease. The underlying experimental approach available to the veterinary clinician, backed by pathological services, allows him to develop quite differently from his counterpart in human medicine and there is little excuse for a non-scientific foundation to clinical studies in a veterinary teaching school. There need be no void, therefore, on the clinical side of medicine, inviting the encroachment of pathology. That there has been a void, however, can be seen in various ways, of which the development of the Veterinary Investigation Service of the Ministry of Agriculture and the planning of the School of Veterinary Medicine at Cambridge can be cited as specific examples.

Without embarking on a detailed analysis of the

* This definition of a pathologist has been chosen deliberately in order to draw the general distinction between pathological and clinical activities. That the term is often reserved for morbid anatomists alone has no material bearing on the present arguments.

form of the Veterinary Investigation Service, the reader is asked to accept the aphorism that this Service has been built up from a basis of routine laboratory tests. That is, the staff of the Veterinary Investigation Centres are trained in general laboratory work, primarily bacteriology. A comparable service in human medicine can be found in the Public Health Laboratory Service and in the laboratories attached to hospitals and staffed by pathologists in the widest sense. In human medicine, however, these laboratories feed back their information sometimes to the practitioner but more often to the consultant and specialist clinical services. It is this other side of the coin, the consultant clinical services, that are so conspicuously absent in our own organisation to-day, and it is difficult to see from where they are to arise unless the veterinary teaching schools initiate them.

The present pattern of the School of Veterinary Medicine at Cambridge is the profession's latest monument to the era of gross imbalance between pathology and clinical science. There are but two Departments in the School—Animal Pathology and Veterinary Clinical Studies. The latter Department embraces animal health (which itself includes animal management, breeding, housing and nutrition, preventive and State medicine, with meat inspection), and the whole of medicine and surgery. In short, a gallimaufry of everything outside the pre-clinical years that is not pathology. It may not be necessary, perhaps, to work in such an environment in order to realise the difficulty of advancing all these sciences under such conditions. It would be as illogical to combine our departments of physiology, biochemistry, anatomy and zoology into departments of biology. Lest it be felt at this stage that the writer is unaware of the doctrine that advances are often most dramatic on the fringes between sciences, the perils of intellectual rigidity may now be acknowledged. But one can believe the former doctrine without losing faith in the function of parent subjects. If we all move into the fringes, the true fringes merely shift elsewhere and hence some division of the sciences, always providing this is appropriate to the age, is necessary. Neither does the writer wish to leave the impression that he favours the restriction of the pathology departments. On the contrary, one must hope that the future development of veterinary pathology will follow that in human medicine, with separate departments of morbid anatomy, virology, and so on. The way to redress the imbalance now under discussion is to give increased facilities to the clinical sections without curbing the indispensable work of the pathologists.

In summary, therefore, it is now proposed that the teaching schools should not only train practitioners in a different way but that they should be developing specialised consultant services at an advanced level. There should be in each school specialists trained in the problems of a species, in constant touch with, and assisting, the development of the community they serve—whether it be the poultry industry, the pig industry, or the horse or dog breeders—and able to provide an over-all veterinary experience that these communities now demand. These specialists, together with clinical specialists of other types, while able to teach the day-to-day problems of disease in practice would be available for a wider form of advice, which at the moment the profession is failing to provide. It is not only in clinical work that these specialists are required however; they are essential also in the important fields of animal housing, genetics and similar subjects. If we do not provide them ourselves in these latter instances they will develop elsewhere, because the need is urgent and real.

Financial considerations

The financial implications of the foregoing proposals fall under two headings. First, there is the general and somewhat political consideration as to whether the farming community and others seeking specialised advice can and should pay for such help and, secondly, there is the more official matter of Treasury support for the veterinary schools. These two questions, like so many others discussed above, are interrelated but they can be discussed separately in the first instance.

The attitude of any individual to the question of compulsory payment will be largely coloured by his general approach to one of the major problems of this country at the moment: to what extent should the community meet the expenses of the individual? This theme runs through many major issues such as housing, health and education. Most of these issues impinge upon the individual citizen and his family, however, and there is far less State interference with larger organisations, as in industry—unless, of course, a sector of industry is completely nationalised. Without expressing one's personal views on the merits of State control, it would seem reasonable to accept the fact that if the State takes over a service it usually does so completely. Thus all sections of the National Health Service are equally available to the public and, similarly, there is no major section of education from which the child of ability is debarred. There are, of course, parallel and prized fee-paying alternatives to the State machines in both health and education, but the latter organisations are complete in themselves.

At the practitioner level, the veterinary profession in Britain is a privately-run service and the immediate question is, can the profession develop in two halves in the future, being largely State-controlled at the consultant level and privately-controlled at the practitioner level? At the moment, the largest consultant service in the profession is controlled and administered by the Government, through the Ministry of Agriculture, and this intervention by the State in a non-nationalised profession introduces a number of important factors for the future. One of these is the obvious anomaly arising from the exclusion of pet animals from the State scheme. The writer does not wish to give his personal views on these political questions because he is anxious to present the current situation factually, making the starting points at least of these various arguments non-controversial. While bringing together the considerations that are likely to influence the future, however, it is pertinent to introduce one

of the views of Dr. W. R. Wooldridge, Scientific Director of The Animal Health Trust—the largest privately-controlled consultant organisation in the profession. In his opinion an important purpose of the Trust is to provide an advisory and research service independent of official thought and outside bureaucratic control. The great value of any alternative to a State monopoly is widely recognised in other directions and this might be taken into account when debating the future consultant structure of the profession.

Whether the farming community in particular, and other animal owners, should pay for consultant and advisory services is largely a political question; whether they can pay is essentially an economic one, and here it is the writer's view that they can. The agricultural industry, for example, is a large industry entered into in the main for private gain. Veterinary advice is sought to make a farming enterprise more profitable, and should the problem demand the advice of a specialist, then it likewise deserves the necessary expenditure. The idea that a farmer should undertake a financial exercise without expecting to meet the costs of his activities is untenable; his veterinary charges are as much a part of his costs as his rent, food bills and wages. In the writer's experience, the main complaint of progressive and successful farmers is not that they cannot afford consultant advice but they cannot find the type of specialist veterinary advice that they seek. The few specialised consultants now operating from the veterinary schools are certainly not under-employed and there is no evidence that an adequately trained and competent consultant service on a wider basis would not justify its existence or be beyond the reach of the farmer or pet owner economically.

Returning to the question of financing university departments in clinical medicine, it is well-known that there are difficulties here, largely arising from the laudable desire to preserve academic independence. It is equally well-known that for some time, discussions have been in progress on how this particular problem might be overcome. As yet, there is no sign that the relatively high cost of running a fully-equipped veterinary school, carrying out all the research and clinical work envisaged in this article, will be met, but in the meantime it would be useful if the profession could explore the best means of deploying its limited man-power. Clinical schools functioning on the pattern now advocated would assume a greater rôle in the profession and perhaps approach the status enjoyed by some teaching schools in human medicine, such as Guy's and St. Mary's Hospitals. Whatever their ultimate status, however, the balance between the Agricultural Research Council, the Animal Health Division of the Ministry of Agriculture, and the university veterinary schools would shift slightly and it would seem more profitable that any shift in emphasis of this type should be governed by forethought, and some recognition of each other's interests and responsibilities, than by competitive struggle.

There is but one source of veterinary graduates—the teaching schools—and if it be accepted that clinical departments staffed by consultants who are also research workers would improve the quality of veterinary graduates, the whole profession stands to gain.

Reference

GOODWIN, R. F. W. (1959). The Clinical Specialist. *Vet. Rec.* 71: 674.

NEW MINISTRY LEAFLET ON HYPOMAGNESAEMIA

The Ministry has issued a new leaflet, No. 49 in the Animal Health Series, on hypomagnesaemia.

The leaflet, which can be obtained from any of the Ministry's offices or from the Department of Agriculture for Scotland, tells farmers how to guard against trouble from hypomagnesaemia and what to do if symptoms appear.

IN PARLIAMENT

Anthrax

Mr. Janner (Nov. 25th) asked the Minister of Labour what steps he proposes to take to implement the recommendations of the Report of the Committee of Inquiry on anthrax; and to what extent this will involve legislation.

The Parliamentary Secretary to the Ministry of Labour (Mr. Peter Thomas) : This Report, which was published on November 11th, is comprehensive and valuable and my right hon. Friend and I would like to take the opportunity of thanking the Chairman and members of the Committee of Inquiry for their work. The recommendations are now being studied. Several require changes in the law, the nature of which is indicated in the summary of recommendations at the end of the Report.

Mr. Janner : How long is it likely to be before the hon. Gentleman will have considered the Report fully? In view of the serious nature of the disease, will he ensure that legislation on the recommendations is introduced as speedily as possible?

Mr. Thomas : The Report came out only on November 11th. It contains twenty-eight recommendations and more than half of them recommend changes in the law. As the hon. Gentleman will appreciate, it is important that there should be consultation with other Government Departments and with all the outside interests concerned, but I can assure him that the consultations will be undertaken as speedily as possible.

Mr. Prentice : While appreciating what the hon. Gentleman has said about the complexity of the problem, may I ask him whether early action can be taken on the recommendations in paragraph 242 and the following paragraphs about arrangements being made for better washing facilities on the docks and so on? That would be relatively simple. Will he see if he can take early action on those matters while the more complicated subjects are being considered?

Mr. Thomas : I will certainly look into that matter. I am sorry that I cannot give the hon. Gentleman a firm reply at the moment.

Prevention of Swayback in Lambs

BY

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SUMMARY.—A hill flock of 128 ewes with a known history of swayback was used to assess the prophylactic effect of copper glycine. The flock was divided into two groups; 45 mg. copper as copper glycine was injected subcutaneously into 44, and intramuscularly into 20 ewes about mid-pregnancy; the remaining 64 ewes served as controls. Sites of injection were examined three times. Only slight local reactions were observed in 10 ewes and no lameness in any. The subcutaneous route was found to be better than the intramuscular for injection of copper glycine in sheep.

Blood samples were taken from all ewes for estimation of copper in December, January, February, and May. There was a marked increase in mean blood copper values one month after injection.

Swayback was confirmed in eleven lambs, ten from control ewes and one from an injected ewe, giving incidences of 15.6 and 1.5 per cent., respectively. The results are similar to those obtained previously, when copper sulphate was given orally or intravenously to ewes on the same farm: they also indicate that one injection of 45 mg. copper as copper glycine to ewes about mid-pregnancy is an effective prophylactic against swayback.

THE chief manifestation of copper deficiency in sheep in Britain is swayback or neo-natal ataxia in lambs, which Innes and Shearer (1940) have described as characterised pathologically by symmetrical demyelination of the cerebrum with secondary degeneration of the motor pathways. Its association with copper deficiency was first demonstrated by Bennetts and Chapman (1937). A low copper status of ewe and lamb, however, does not invariably lead to ataxia in the lamb, although affected lambs and their mothers have always been found to have a low copper status.

Nevertheless, there is ample proof that administration of sufficient copper to the pregnant ewe will prevent the occurrence of swayback in lambs (Russell & Duncan, 1956). In areas such as parts of Australia, where enzootic ataxia in lambs is associated with a low copper content of pastures (5 parts per million (p.p.m.) or less in dry matter (D.M.)), it has been shown that raising the copper content of the herbage by top-dressing with 5 to 10 lb. of copper sulphate per acre is effective and economic as a method of control. But it is not satisfactory in Great Britain, where the deficiency is nearly always "conditioned" or "induced," occurring on pastures containing apparently adequate concentrations of copper, from 8 to 20 p.p.m. (Allcroft & Lewis, 1957). In such pastures it has been shown (Morgan & Clegg, 1958; Jamieson & Allcroft, 1951) that an increase in copper content does not always occur even after an application of as much as 10 lb. copper sulphate per acre. Other objections to this method of control are the need for annual application, the cost of labour, and, in particular, the risk of copper poisoning in sheep grazing pastures contaminated with extraneous copper sulphate.

The conventional prophylactic measures at present in use against swayback are administration of copper to the pregnant ewes by systemic dosing with copper sulphate or by offering copperised salt licks or mineral mixtures. These methods also have some disadvantages (Hunter, Eden & Green, 1945; Allcroft & Lewis, 1957). In 1946, Allcroft, W. M., Hunter and Salt (1946) investigated the effect of copper sulphate injected intravenously into ewes for the control of swayback, a method found to be as effective a measure of control as dosing with copper sulphate during pregnancy. The outcome of this experiment was referred to by Green (1947) in a review article but the details have never been published*. It was realised that intravenous injection of a flock of ewes was impracticable, but it was hoped that a non-irritant copper compound would be found suitable for a single prophylactic injection by some other route to the ewe during pregnancy. It was not until Cunningham (1957), in New Zealand, showed that copper glycine incorporated in a sterile base of neatsfoot oil with marrow fat, or beeswax with peanut oil, was suitable as a source of copper for subcutaneous or intramuscular administration to

* From 1944-7, members of the Biochemistry Department of the Veterinary Laboratory, Weybridge, with A. H. Hunter, Field Staff, carried out a series of investigations on swayback, the results of which have never been published. Those taking part were (alphabetically): Allcroft, R., Allcroft, W. M., Blaxter, K. L., Clarke, C. W., Green, H. H., Paterson, A. B., and Salt, F. J. Some of the results obtained during these investigations are referred to in the present paper.

cattle and sheep, that the control of swayback by parenteral administration of copper was investigated further.

The purpose of the work reported here was to assess the prophylactic effect against swayback of a copper glycine preparation injected subcutaneously or intramuscularly into ewes at about mid-pregnancy.

Experimental

Farm and Ewes

The history of the hill farm in Derbyshire on which these observations were made had been known for many years, and flocks had previously been used for several seasons (1942-7) for investigating the occurrence and prevention of swayback. Before prophylactic measures were taken, the incidence of swayback was always high. The present flock consisted of 128 Gritstone-Lonk cross Swaledale ewes, of which 20 had been recently bought and had been on the farm only about two months before the investigation began. The flock was divided into two equal groups, each including half of the 20 recently bought ewes. Each ewe was identified by a numbered and coloured ear tag. The ewes of one group were injected with copper glycine at about mid-pregnancy on January 21st; those in the other group served as controls.

The tups ran with the ewes during the latter half of October and throughout November, so that lambing took place during March and April. Except for the injections, the treatment of the entire flock, including management and grazing, was the same.

Blood Samples

Oxalated blood samples for determining copper by a modification of the method of Eden and Green (1940) were taken from all ewes on four occasions; December 2nd, 1957, January 21st, 1958, February 18th, 1958, and May 7th, 1958.

Copper Compound Used

Immediately after taking the blood samples in January, a standard copper glycine product in a tube* was injected by the intramuscular or subcutaneous routes into 64 ewes. This product was similar to that reported by Cunningham (1957); it was incorporated in a base consisting of arachis oil and beeswax gel and was contained in single-dose tubes delivering 45 mg. copper as copper glycine (copper amino-acetate) in a total volume of about 1.2 ml. The tubes were fitted with a record mount and the contents squeezed through a 17-gauge needle 1¼ inches in length, which was found to be the most satisfactory size.

Injection Sites

Copper glycine was given (a) intramuscularly into the back of the left thigh to 20, (b) subcutaneously into the loose skin in the front of the brisket to 26, and (c) subcutaneously behind the shoulder to 18 of the 64 ewes injected. The site for injection was prepared by clipping the wool and disinfecting the skin.

* Copper "45" Injection, Glaxo.

Assessment of Reactions

Sites of injections were examined when the ewes were gathered for blood sampling in mid-February, in early May, and immediately after shearing in mid-June, which was five months after the injection. Three of the twenty ewes injected intramuscularly were killed for *post-mortem* examination on August 27th, 1959, approximately 7 months after the injection.

Assessment of Incidence of Swayback

Post-mortem examinations were made on all lambs found dead, and on clinically affected lambs after destroying them with pentobarbitone sodium. Livers were taken for estimation of copper. Brains, and in most instances, spinal cords also were taken for histological examination. The material was fixed in 10 per cent. neutral formol-saline and processed by standard techniques for observing demyelination and neuronal degeneration.

Results

REACTIONS

1. One Month After Injection

Subcutaneous Route

a. *Brisket site.* Only six of the twenty-six animals showed some degree of local reaction. This ranged from a slight hard swelling to a small cold abscess with a tendency to slough.

b. *Shoulder site.* Cold abscesses were detected in three of the eighteen ewes, but sloughing occurred in only one; the remaining two had slight swellings approximately the size of a hazelnut.

Intramuscular Route

A slight thickening of the injected area could be detected in only one of the twenty animals treated.

2. Five Months After Injection

Subcutaneous Route

Only thirty-nine of the forty-four animals in this group were examined, as the remainder were not present at shearing. Slight traces of local reactions were seen in only ten ewes in which small fibrosed nodules about the size of a hazelnut were found. In one of these ewes a tuft of wool was lifted from the injection site to reveal a perfectly healed scar, as if healing had taken place by first intention.

Intramuscular Route

Seventeen animals were examined; no palpable reactions could be detected. The remaining three ewes were not available. Two months later (seven months after injection), three ewes were killed and their left hind legs were examined for injection sites. A small fibrosed nodule, about the size of a pea, was detected in the thigh muscles of each. On section these nodules showed brownish centres surrounded by white fibrous tissues. There was no cyst formation or necrosis of the muscle.

BLOOD COPPER LEVELS

In Fig. 1, the mean blood copper values are given for fifty-four control and fifty-four injected ewes, of

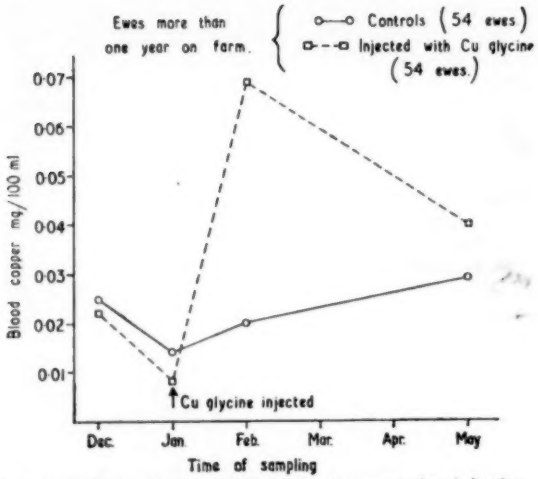

FIG. 1.—Effect of subcutaneous or intramuscular injection of 45 mg. copper as copper glycine on mean blood copper levels of pregnant ewes on the farm for longer than one year. Injection immediately after blood samples taken in January.

which all had been on the farm more than one year. The mean values for the two groups of ten ewes recently introduced on to the farm are shown in Fig. 2. These were not included in the larger groups, since their initial blood copper levels were much higher than those of the ewes that had been on the farm much longer.

For all groups of ewes, mean blood copper values were lowest in January, the fall in the two small groups of recently introduced ewes being greatest in the seven weeks between the time of taking the first and second blood samples. There was a marked increase of blood copper in the injected ewes one month after administering copper glycine subcutaneously or intramuscularly. This was greatest in the larger group of fifty-four ewes with the lowest initial blood copper levels. The mean value for these ewes in mid-February was only just below the lower end of the accepted normal range (0.07 to 0.17 mg. per 100 ml. (Beck, 1941)), and those for the small group of ten injected ewes just reached it (0.07 mg. per 100 ml.). When blood samples were next taken early in May, at the end of lambing, the values for all injected ewes had fallen from the February peak, but not to pre-injection levels.

Throughout the five-month period of observation, mean blood copper values for the larger group of control ewes were low and well within the copper-deficient range. Values for the small group of recently introduced control ewes were also below normal, except the initial December values.

HISTOLOGICAL FINDINGS

Lesions of demyelination and neuronal degeneration conforming with the diagnosis of swayback were found in ten lambs from control ewes, but in only one from the group of injected ewes. Their clinical histories are summarised in Table I, along with liver copper contents of lambs and blood

TABLE I
CLINICAL HISTORY, LIVER COPPER VALUES AND HISTOLOGICAL FINDINGS OF LAMBS KILLED OR FOUND DEAD

Ewe and lamb identification	Blood copper of ewes 18th Feb. mg/100 ml.	Age of lamb in days	Clinical history	Liver copper p.p.m. (D.M.)	Histological findings
Control ewes					
2 i	<0·01	1	Unable to rise	7·9	+ve
ii		0	Drowned	7·8	+ve
iii		0	,,	7·5	−ve (*a*)
4	0·01	27	Delayed swayback	6·5	+ve
20	0·01	8	Early sway-back	6·5	+ve
42	0·01	35	Delayed	8·9	+ve
47 i	<0·01	3	Unable to rise	4·3	+ve
ii		39	Delayed	7·1	+ve
62	0·01	1	Found dead	7·5	+ve
46	<0·01	20	Delayed	3·8	+ve
57	<0·01	28	Delayed—drowned	3·2	+ve
Injected ewes					
202	0·07	1–2	Found dead	260·0	−ve
220	0·01	28	Delayed	5·6	+ve
235	0·08	1	Unable to rise	7·1	−ve
256	0·05	0	Aborted	32·0	−(*b*)
250 i	0·07	0	Still-born	46·0	−ve
ii		1–2	Found dead	52·0	−ve

(a) Spinal cord not examined.
(b) Material unsuitable for examination.

copper contents of the ewes. In two instances the material was unsuitable for histological examination and in three the spinal cords were not obtained. No demyelination or neuronal degeneration was observed in the brain of triplet iii from ewe 2; since the spinal cord was not available for examination, it has been classified as negative in Table I. From the evidence available the incidence of swayback is assessed as 15.6 per cent. in the control group and 1.5 per cent. in the injected group.

LIVER COPPER VALUES

Table I shows that all the values for liver copper in dead lambs from control ewes were below 10 p.p.m. ($D_2M.$). Liver copper concentrations of about 15 p.p.m. and less have been found to lie within the range in lambs affected with enzootic ataxia in Australia (Bennetts & Beck, 1942) or with swayback in Britain (Allcroft & Lewis, 1956, 1959).

In lambs from injected ewes, copper concentrations of the livers from four of the six dead lambs were above the "swayback range," that is above 15 p.p.m. Histological examination confirmed demyelination in the lamb with the low liver value of 5.6 from ewe 220, but there was no evidence of demyelination in the lamb from ewe 235. Liver copper values of less than 15 p.p.m. have frequently been found in clinically normal lambs showing no evidence of demyelination on examination, but as far as is known, all lambs with confirmed demyelination have had a low copper status (Allcroft & Lewis, 1956). The levels of blood copper in ewes 220 and 235 in February were 0.01 and 0.08 mg. per 100 ml., respectively. In ewe 220, blood copper was at the

low level of 0.01 mg. per 100 ml. when blood samples were taken in December, January, and February. This was the only one of the sixty-four injected ewes failing to show an increase in blood copper in February, one month after the injection was given, suggesting that either little or no absorption of copper occurred or that depletion of absorbed copper had been exceptionally rapid. These low blood copper values indicate that the copper status of the ewe was low throughout pregnancy and therefore that demyelination in the lamb would be a possibility. The increase in the blood copper level of ewe 235 from 0.01 in December and January to 0.08 mg. per 100 ml. in February, one month after injection, indicates a satisfactory absorption of copper.

Discussion

All investigators agree that a low copper status of ewe and lamb is characteristic of swayback or enzootic ataxia, but there is still no exact definition of the lesions, even though it is now more than 25 years since Bennetts (1932) first reported that degeneration of the myelin sheaths of nerve fibres in the cord was always found in lambs affected with enzootic ataxia. Barlow (1958) has pointed out that differences in the pathological manifestations occur and has suggested that although the cerebral lesion is diagnostic when it is present, its absence from some of the more severe cases may indicate that the fundamental lesion might be elsewhere. He, as well as Bennetts and Beck (1942), have reported that lesions in the spinal cord are a more constant finding in clinically affected lambs than are cerebral lesions.

Stewart (1932) believed that when only one of twins was affected at birth, the other would usually show symptoms (including lesions) later in life. Terlecki (1959) has observed that in multiple births it is common for all lambs to be affected, although not necessarily to the same degree. With the triplets from ewe 2 (Table I) it would thus seem that the absence of lesions in the brain of lamb iii does not rule out the possibility of a positive diagnosis had the cord been available for examination.

A notable clinical feature of this investigation was the high percentage (6 of the 11 affected lambs) of delayed cases of swayback and the sudden onset of symptoms in lambs previously appearing normal. Ataxia is often not severe enough in some delayed cases to cause death or poor thriving, but such sudden onset of symptoms may cause losses by drowning of otherwise good lambs on hill farms where swayback may not be suspected.

Our biochemical and clinical findings confirm and extend the unpublished observations of Allcroft, Hunter, and Salt (1946), which demonstrated that parenteral administration of copper to ewes during pregnancy was an effective method of preventing swayback in their lambs. They gave intravenously 20 mg. Cu as a solution of copper sulphate in physiological saline to a group of 34 ewes at about mid-pregnancy. Another similar group were given 1.5 g. copper sulphate (approximately 375 mg. Cu) orally at about ten and four weeks before lambing, a third group being left as controls. Since blood samples were taken at approximately the same time of year and at the same intervals, and since the hill farm on which the flocks grazed was the same as in our investigation, it seems pertinent to show in Fig. 3, for comparison with those shown in Fig. 1, the blood copper levels found by Allcroft, Hunter, and Salt (1946).

The mean values for the 1946 and 1958 control groups (Figs. 1 and 3) were closely similar, both showing in February a slight increase that continued

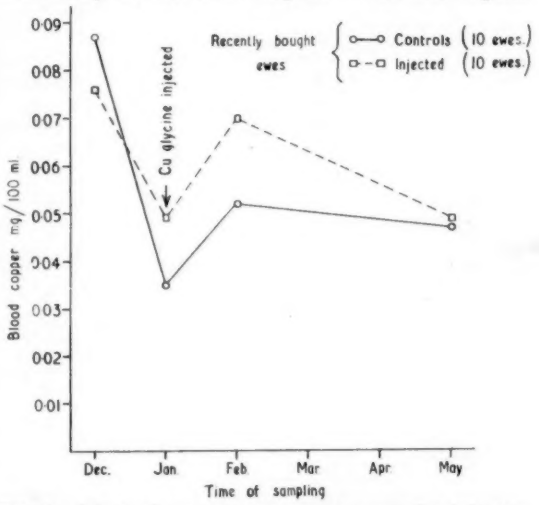

FIG. 2.—Effect of subcutaneous or intramuscular injection of 45 mg. copper as copper glycine on mean blood copper levels of pregnant ewes on the farm not longer than 2 to 3 months. Injection immediately after blood samples taken in January.

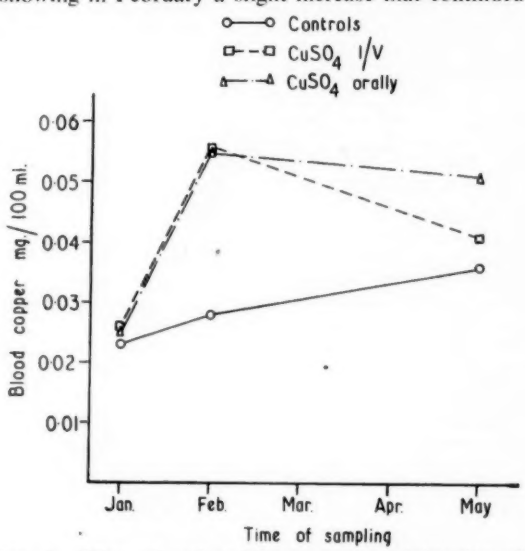

FIG. 3.—Effect of oral and intravenous administration of copper sulphate on mean blood copper levels of pregnant ewes. A drench of 1.5 g. copper sulphate (about 375 mg. Cu) given at ten and four weeks before lambing to 36 ewes; 20 mg. Cu as a solution of copper sulphate in physiological saline given intravenously to another group of 36 ewes immediately after blood samples taken in January, 1946. A third group of 36 ewes as controls.

to May, but both remaining well below the normal range through the whole period. In the 1946 trial, the increases obtained one month after administration of copper by the intravenous and oral routes were approximately the same, mean blood copper values of about 0.055 mg. per 100 ml. being found for each group. These increases were less than that produced by the subcutaneous or intramuscular injection of 45 mg. Cu as copper glycine, which gave a mean value of 0.069 mg. per 100 ml. (Fig. 1). In both the 1946 and 1958 trials, mean blood copper values of the groups given one dose of copper parenterally fell to approximately the same level of about 0.04 mg. in May, 3 to 4 weeks after lambing. In the orally dosed group in the 1946 trial the second dose of copper maintained the mean blood copper level at 0.05 mg.: the differences between the three groups are small but significant ($P = 0.05$).

In neither of the two seasons (1946 and 1958) was the incidence of swayback high, in the country generally or on the particular farm where the investigations were made. In 1946, four cases occurred in the control group, an incidence of 11.8 per cent.; no cases were recorded in lambs from ewes in either of the two groups receiving copper. In 1958, ten cases occurred in the control group, an incidence of 15.6 per cent., and one in the injected group, an incidence of 1.5 per cent.

The occasional occurrence of swayback in lambs from ewes given copper therapy during pregnancy was reported by Hunter, Eden, and Green (1945) and has been frequently noted under field conditions when the administration of copper was less strictly controlled. On two farms, Hunter *et al.* (1945) found incidences of approximately 8 and 5 per cent. in groups of ewes that had been drenched with 0.5 g. copper sulphate at fortnightly intervals throughout pregnancy; these compared with incidences of about 27 and 25 per cent., respectively, in control groups which received no copper therapy. Eden, Hunter, and Green (1945) record that all copper-treated ewes with affected lambs had low initial blood copper values, which showed only a slight increase, or none, during pregnancy and remained within the range <0.01 to 0.03 mg. per 100 ml. despite the frequent dosing with copper sulphate. They also record that several other ewes with blood copper levels that failed to respond to copper treatment nevertheless gave birth to apparently normal lambs.

In the 1958 investigation, no increase in blood copper was observed one month after subcutaneous injection of copper glycine into the ewe (No. 220, Table I) with the swayback lamb; her blood copper remained at the low level of 0.01 mg. (or less) per 100 ml. through the entire period of observation. Of the 64 ewes injected with copper glycine this was the only one failing to show any increase in blood copper. This apparent failure of parenteral or oral administration of copper to increase the copper status of ewes known to have been copper deficient for a year or more is similar to the slight response observed in some copper-deficient adult cattle after injection of copper intravenously, subcutaneously, or intramuscularly (Allcroft & Uvarov, 1959). It may be speculated that the hepatic cells responsible for storage of copper are either unable to form or unable to retain the necessary copper-protein complex because of some interference with intermediary copper metabolism. There is ample evidence, however, to show that copper-deficient sheep and cattle as a rule respond satisfactorily to copper therapy and that a marked increase in blood and liver copper concentrations results from administering adequate amounts of suitable copper compounds, although a fall to subnormal levels may occur within a month or two on pastures inducing severe copper deficiency. In most instances the lower the initial blood copper level, the greater is the increase resulting from any particular dose of copper. For example, a much smaller increase in blood copper concentration occurred after injection of copper glycine into the recently bought ewes, whose blood copper levels were initially within the normal range (Fig. 2), than in the older ewes, whose initial blood copper levels were markedly low (Fig. 1). A similar observation was made during investigations (unpublished) on the same farm in 1946 after oral administration of 1.5 g. copper sulphate to recently bought ewes of normal copper status and to ewes of low copper status that had been on the farm for one or more years. Allcroft and Uvarov (1959) also showed that parenteral administration of 120 mg. Cu. to cattle of normal copper status caused no significant increase in blood copper levels. It is also known that, even when the copper concentration in the liver in sheep is dangerously high (1,000 p.p.m. or more in dry matter), the blood copper concentration remains within the normal range until the premortal rise that occurs during the haemolytic crisis of chronic copper poisoning (Eden, 1940; Bull, 1951).

The susceptibility of sheep to chronic copper poisoning is well known; during recent years many recorded outbreaks have been caused by the excessive consumption of copperised mineral mixtures or concentrate rations (Allcroft & Lewis, 1957, 1959). The parenteral administration of a known amount of copper affords a safer as well as a more certain means of prophylaxis than the use of oral copper supplements, unless the latter are given by individual drench, which is both laborious and uneconomic. The intravenous injection of copper is unsuitable for field use, especially for sheep, and our investigation has indicated that subcutaneous or intramuscular copper glycine is a suitable and convenient form of copper treatment for ewes. Previous investigations, in which absorption was assessed by the increase in the copper concentration of liver biopsy samples, showed that injection of 45 mg. Cu as copper glycine was a safe dose for sheep of normal copper status and that two or more such doses had to be given to sheep with initial liver copper concentrations of about 200 p.p.m. (D.M.) before a dangerously high concentration was obtained (Lewis, Allcroft & Uvarov, 1958). Although administration of 2×45 mg. doses of copper glycine during pregnancy might maintain a higher copper status for a longer period in ewes on farms where copper deficiency is known to be severe, this would require an extra gathering and handling of the flock, which most owners wish to avoid. Moreover, the results now reported show

that one subcutaneous or intramuscular injection of 45 mg. Cu as copper glycine is an effective prophylactic measure against swayback.

We have paid special attention to local reactions from this injection. Cunningham (1957) observed that injection of copper glycine by the subcutaneous route (in a slightly different base) caused a swelling of about 3 inches diameter within the first seven days, but that after thirty-six days the lesion was inconspicuous. Similarly he noted that no residual effect occurred in 12 out of 13 animals injected by the intramuscular route and examined more than thirty-six days after injection, although an initial reaction was present fifteen to twenty-one days after injection. In the remaining animal a small cold abscess of $\frac{3}{4}$-inch diameter was detected. In our investigation the slight reactions observed in only 9 of the 44 animals one month after injection by the subcutaneous route were similar to those reported by Cunningham (1957); careful examination at shearing time, five months later, showed little residual tissue damage. No difference in local reactions was apparent at the brisket or shoulder sites of injection, but the latter was much more convenient and would be preferable when a large number of sheep are to be treated.

Negligible local reactions, with no lameness, were observed in the 20 ewes one month after intramuscular injection, and *post-mortem* examination of the thigh muscles of three ewes six months later showed only small fibrosed nodules. In spite of the slight lesions observed after intramuscular injection, it is concluded that the subcutaneous route is the better for injection of copper glycine in sheep, a conclusion based on further *post-mortem* examinations of sheep killed 1 to 6 months after injection of copper glycine by the intramuscular route. These examinations showed various degrees of necrosis, fibrosis, and cyst formation, the lesions being greatest in animals killed 1 to 2 months after injection (Burns, Allcroft, & Uvarov, 1958). Absorption of copper was found to be equally good by both routes, and, since a site behind the shoulder is convenient for the injection of penned sheep, there seems no reason for using the intramuscular route. Cunningham (1957) has also remarked on the possible formation of sterile abscesses in sheep or cattle killed shortly after injection of copper glycine by the intramuscular route, but in a later report (1959) he has pointed out that, although some local reaction may occur after subcutaneous or intramuscular injection of 45 mg. Cu as copper glycine, there is no risk of poisoning.

Acknowledgments.—We thank Dr. S. Terlecki for histological examination of material from lambs, Mr. R. R. MacKay for help with some of the field work, and Mr. N. E. Eyre for the use of his flock and his ready co-operation.

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ELECTION OF MEMBERS OF THE COUNCIL R.C.V.S.

In accordance with the provisions of the Veterinary Surgeons Act, 1948, five members of the said Council, who must be members of the Royal College, will be elected in 1960 by members of the Royal College residing outside the Republic of Ireland.

Five present members of Council will retire at the Annual General Meeting in 1960 and are eligible for re-election, namely:—

A. D. J. Brennan, C.B.E., M.R.C.V.S., Ministry of Agriculture, Hook Rise, Tolworth, Surbiton, Surrey; G. N. Gould, J.P., F.R.C.V.S., 10, Landguard Road, Southampton, Hampshire; P. S. Pugh, M.B.E., M.C., T.D., M.A., PH.D., M.R.C.V.S., A.R.I.C., Department of Veterinary Clinical Studies, Madingley Road, Cambridge; H. Sumner, C.B.E., M.V.SC., F.R.C.V.S., D.V.H., 16, Eaton Road, West Derby, Liverpool, 12; and H. M. Wilson, M.R.C.V.S., 134, Bonnygate, Cupar, Fife.

The term of office of the five persons elected in the place of the five members retiring by rotation will be four years.

Nominations of persons for election to the Council must be submitted in writing on a form which may be obtained from the undersigned, and which must be returned to him duly completed on or before January 31st, 1960.

Each such nomination form must bear the signature of the proposer and seconder, who must not be present members of Council, and must be countersigned by the nominee.

W. G. R. OATES, *Registrar.*

Veterinary Surgeons Acts, 1881-1948,
9, Red Lion Square,
London, W.C.1.

The Milk Marketing Board Twinning Trial

Our readers will remember that, a short time ago, the Milk Marketing Board kindly undertook to provide an exclusive interim report on their current twinning experiment in cattle. The following paper has just been received through the courtesy of Mr. G. F. Smith, the Board's chief veterinary officer; the authors are Mr. G. Williams and Dr. Ian Gordon to whom we are much indebted.

Introduction

THE Milk Marketing Board's scheme started in Mid-Wales on January 1st, 1959, and is scheduled to run for 2 years. Up to the end of October, 181 cows in 123 herds have been entered in the scheme. Originally it had been intended to confine the trial to users of A.I. in the area covered by the Welshpool main centre and its Caersws sub-centre in Montgomeryshire. The number of animals being made available in the area was, however, smaller than had been hoped and so the area of the trial was extended to cover the whole area serviced by the Welshpool centre and its sub-centres. This area was chosen due to the high proportion of inseminations being carried out with Hereford semen in the multiple suckling type of herd.

Interim Results

To induce twinning freeze-dried P.M.S., given subcutaneously, has been used. A dose of 1,000 units given on the 17th day of the cycle was given for the first 2 months of the trial, but as 3 out of 8 cows injected during the second month produced more than 2 eggs, the dose was then reduced to 800 units. This dosage level was continued until the end of July. At this time it became apparent that the response was declining so the dose was again increased to 1,000 units for alternate animals. The 800 unit dose being also continued as a control. Response is judged by an examination at 7 to 14 days after insemination to determine the number of corpora lutea in the ovaries.

From the rather small monthly figures in this Table, it does appear that a seasonal effect is involved, response being lowest in the summer months of June-July.

The over-all position is that out of 127 animals which have been injected and examined, 37·8 per cent. have responded by having more than one ovulation.

Apart from the effect of seasons the response seems to be directly affected by the interval between the injection of P.M.S. and the animal coming into heat.

The optimum period for obtaining supraovulation appears to be 4 days. There has been no response at all in animals which have come on heat within 2 days of being injected.

TABLE I
OVARIAN RESPONSE TO P.M.S. ADMINISTRATION IN RELATION TO TIME OF YEAR

Month of examination	All doses of P.M.S.			800 I.U.			1,000 I.U.		
	Cattle examined	Number that responded	Percentage that responded	Cattle examined	Number that responded	Percentage that responded	Cattle examined	Number that responded	Percentage that responded
January ...	5	3	60·0	—	—	—	5	3	60·0
February	11	8	72·7	—	—	—	11	8	72·7
March ...	7	2	28·6	7	2	28·6	—	—	—
April ...	3	2	67·0	3	2	67·0	—	—	—
May ...	18	10	55·6	18	10	55·6	—	—	—
June ...	22	4	18·2	22	4	18·2	—	—	—
July ...	26	6	23·1	22	5	22·7	4	1	25·0
August ...	25	11	44·0	10	5	50·0	15	6	40·0
September	6	2	33·3	4	1	25·0	2	1	50·0
October ...	4	0	Nil	1	0	Nil	3	0	Nil
	127	48	37·8	87	29	33·3	37	19	51·4

TABLE II
OVARIAN RESPONSE IN RELATION TO INTERVAL BETWEEN INJECTION AND HEAT

	Interval (in days) between P.M.S. injection and onset of oestrus											All cattle
	1	2	3	4	5	6	7	8	9	10	11	
Number examined	4	10	29	44	26	6	4	2	–	–	2	127
Number that responded ...	0	0	8	26	9	2	2	0	–	–	0	48
Percentage that responded ...	–	–	27·6	59·0	34·6	33·3	50·0	–	–	–	–	37·8

Factors Affecting Individual Response

At the time of the first visit a detailed record is made of relevant particulars such as the breed of the animal, age, previous calving history, method of feeding and management, girth measurement and condition. Hereford, Shorthorn, Friesian and Welsh Black cattle, and also crosses of these breeds have been injected. The animals involved have been under various conditions in the different herds. The data will be fully analysed at the end of the experiment and whilst firm conclusions cannot be made at the present time there are indications that one factor which is affecting the response is the age of the animal. The older animals being more likely to respond than the young.

Pregnancy Diagnosis

All animals which are found to have 2 or more corpora lutea and which do not repeat are again examined for pregnancy at 35 to 42 days after insemination. At this stage the number of foetuses present is determined by palpation of the amniotic sacs. There seems to be little tendency for transmigration in the cow. If 2 ova from one ovary result in 2 foetuses then these will usually be found in the same horn.

In these observations it has been found that there is a considerable cut down in the number of foetuses compared with the number of ova shed.

TABLE IV

	Number of cattle examined	Number of cattle pregnant	Conception rate
Ovulation Data			
Cows shedding 1 ovum...	76	53	69·7
,, ,, 2 ova ...	33	27	81·3
,, ,, 3 ,, ...	7	6	85·6
,, ,, 4 or more	8	4	50·0
All cattle considered ...	124	90	72·6

of twin pregnancies. Further information on the factors affecting response, such as the age of the cow and the seasonal effect already mentioned will, however, be required.

Silent Heats

Twenty-five injected cattle failed to show symptoms of heat at the next anticipated oestrus period. This is 16·5 per cent. of the treated cattle and whilst some of them might not have shown any signs even if they had not been injected, this problem is being studied further. In only 3 animals were abnormalities detected on rectal examination 7 to 14 days after the anticipated oestrus. Two animals had what appeared to be luteinised follicles, and a normal corpus luteum, and one had a luteinised follicle only. Only one animal which had a silent heat had 2 ovulations, all the others had only one. This low ovarian response to the P.M.S. appears to be associated in some way with the factor which causes the suppression of oestral behaviour. Eighteen out of the 25 animals came on heat about 25 days after the injection, *i.e.* 21 days after the expected heat. The remaining 7 were inseminated at periods varying up to 3 months after being injected.

There is no clear-cut evidence that this condition is associated with any particular breed, age of animal, type of management or season of the year. The cause of failure to show signs of heat is not obvious and the involvement of P.M.S. is again not clear.

TABLE III
THE INCIDENCE OF EGG-LOSS IN INJECTION CATTLE

	Cattle examined	Failed to become pregnant	Number of foetuses at 35–42 days					Percentage of all eggs to survive
			1	2	3	4	5	
Ovulation Data								
Cows shedding 1 ovum ...	76	23	53	–	–	–	–	69·7
,, ,, 2 ova ...	33	6	19	8	–	–	–	53·0
,, ,, 3 ,, ...	7	1	3	2	1	–	–	47·6
,, ,, 4 ,, ...	4	2	–	1	1	–	–	31·3
,, ,, 6 ,, ...	3	1	–	–	2	–	–	33·3
,, ,, 15 ,, ...	1	1	–	–	–	–	–	Nil
All cows	124	34	75	11	4	–	–	51·4

From this Table it is seen that out of 33 animals which produced 2 ova only 8 had 2 foetuses. The larger the number of ova produced the greater is the cut down. There appears to be some factor which limits the number of foetuses which the uterus can maintain.

Conception Rate

One hundred and twenty-four injected cattle have now passed the 6-week mark and 90 of these are pregnant—72·6 per cent. In cattle producing 2 to 3 ova the results are particularly good, 81·3 per cent. being pregnant to the 1 insemination, *i.e.* even if there is a cut down in litter size the chances of having 1 calf in this group are better than usual. The ones producing large number of ova do, however, tend to repeat.

In view of these findings of egg-loss in supra-ovulated cattle it may be possible to push up the dose of P.M.S. gradually and so increase the proportion

Calvings

Two sets of induced twins have so far been born, in both cases a heifer and a bull calf. The first pair weighed 81 and 73 lb. and the second pair 71 and 69 lb. In each case the births were uneventful, the

(*Concluded at foot of col. 1 overleaf*)

Current Literature

REPORT

Annual Report of the Veterinary Department Colony and Protectorate of Kenya.

From the vast quantity of facts ably presented it is possible to follow the diseases, animal production, agriculture and domestic pattern of this vast area, and what fascinating reading it makes. Summaries of reports can barely indicate the highlights. I boggle at the numbers in the vaccination and drug treatment programmes. The near completion of the Wellcome Institute for Research in Foot-and-mouth disease is recorded—the importance is underlined by the importation of £77,400 of O & A type vaccine from Holland for use in the settled milk producing areas.

Cattle diseases. These include the difficulties of controlling foot-and-mouth disease in the Masai cattle reserves, and the recognition of lumpy skin disease for the first time (a pox-like virus) causing much economic loss in South Africa. Intensive research is being conducted on the nature of the virus and possible transmission by mosquitoes. Bovine pleuro-pneumonia outbreaks continue in the Masai lands in spite of extensive (945,000 head) vaccination ; this has been discontinued and control attempted by C/F and quarantine. Successes include tick-borne disease control with dipping improved to 300,000 a week in the central province. Drug-resistant ticks are appearing, some surviving because of very rapid feeding times, an interesting but troublesome change in the population. No outbreaks of rinderpest are recorded except in the remote, arid, Turkana area. This success is the reward of the mass vaccination.

Of the infertility diseases, *V. fetus*, *T. fetus*, *Br. abortus* and contagious epididymitis are all present.

Sheep and Goat diseases. Pneumonia is a major problem. The enzootic pneumonia of sheep is controlled by vaccination, but in goats the role of infecting agent (or agents) is not defined. *C. pyogenes* is isolated, and pleuro-pneumonia and rickettsial organisms have been seen.

Fowls. Newcastle disease is the main problem, with up to 50 per cent. mortality. Various vaccines are being tried, but the ideal one has not yet been found.

Helminths. Cysticercosis is a major problem for the abbatoir ; taencosis gave 10 per cent. mortality in sheep in some areas. One feels this is a more important clinical problem than is indicated in the Report.

Meat inspection services. These record the best beef from Boran and Boran-crossbred cattle, exotic beef types being often disappointing. A new bacon factory has been started and a foothold established for exporting chilled and frozen beef. Cysticercosis remains a problem, despite a 2 per cent. decrease, as do damage by bruising and injection-site abscesses.

Livestock improvement. Here the demand for Sahiwal breeding stock exceeds supply. The experimental farms are maintaining improved stocks of native cattle and trials of crosses continue. For those outside the Colony, this Report does justice, I feel, to the vast scale of the problems, and the present highly successful control measures. There is included a very considerable amount of technical detail and a list (50) of publications by the staff.

The Milk Marketing Board Twinning Trial—*Concluded.*

calves and their dams are doing well. Both sets of twins were born on the same farm and the farmer had followed the recommendations to feed an extra 2 to 3 cwt. of high quality concentrates during the final 8 to 10 weeks of pregnancy and this extra feeding may have had a bearing on the successful outcome.

It must be emphasised that these notes are merely interim observations and it is too soon to draw many firm conclusions from the work, which is still in progress. We would like to take this opportunity of thanking veterinary surgeons in practice in this area for their very ready co-operation in this work.

BOOK REVIEWS

Fungal Diseases of Animals. By G. C. AINSWORTH, PH.D., F.L.S., & P. K. C. AUSTWICK, B.SC., F.L.S. (1959). Commonwealth Agricultural Bureaux, Bucks. 20s.

For some time the need for a text-book dealing with mycotic diseases has been under urgent demand from veterinary surgeons in the United Kingdom as well as in other parts of the world. It can be said from the outset that this publication fulfills the need to a most satisfying degree and the book will be of inestimable value to all persons whose activities are associated with care of animals, whether they be veterinarians, doctors, mycologists, or students.

Ainsworth and Austwick have surveyed the many aspects of an extensive literature to present a review which is especially convenient to the practitioner. The book is divided into seventeen chapters, each dealing with a particular class of fungus and its associated disorders. The presentation is concise and factual and yet the important features of each disease are adequately covered. The more specialised aspects of mycological techniques are quite rightly omitted for these can be found in standard manuals. It is perhaps in the sections dealing with treatment that the reader may be disappointed, but this is not the fault of the authors.

Controlled scientific investigations support their contentions that most mycotic diseases appear to be self-limiting or not amenable to specific therapy (however hard these may be for a clinician to accept).

One of the most attractive features of the book is the method of illustration. There are 25 figures, 8 in colour, which are first-class reproductions of excellent photographs. The bibliography and index are comprehensive. It may be argued that the type is on the small side but no doubt this has enabled

the authors to get so much information into 148 pages. All things considered, this book is to be thoroughly recommended.

A Book of Cats, Literary, Legendary and Historical (1959). Methuen & Co. Ltd., London 15s.

This small volume comprises a miscellany of historical and literary references to the cat as associated with man throughout the ages.

For those interested in the cat and especially in its rather characteristic and independent relationship with the human race it will provide much entertainment. Certainly a thought for Xmas for one's more "catty" friends.

Geflugel Krankheiten (Poultry Diseases). A text-book for veterinarians and veterinary students, by Professor KARL FRITZSCHE & Dr. EDZARD GERRIETS. 1959. Paul Parey, Berlin. D.M. 49.

The 2 authors are veterinarians who have themselves contributed considerably to the literature on poultry hygiene and disease. One is the Director of the State Veterinary Investigation Centre in Coblenz and the other is head of the Poultry Disease Section in the Veterinary Faculty of the Humboldt University in Berlin. The authors stress in the preface the part which the veterinary profession can play in the field of poultry health and disease, under the conditions of to-day when poultry prophylaxis has largely taken the place of treatment. The veterinary surgeon must not only be well informed about poultry disease, he must also know how methods of prevention can be fitted into the pattern of the poultry industry.

This is a very useful book for it surveys the fields of poultry hygiene and disease in an authoritative way, with a concise text that is liberally illustrated with some 200 photographs, including an excellent natural colour plate. The main sections deal with hygiene, diseases caused by viruses bacteria and parasites, and dietetics. Poisoning, inherited diseases, metabolic disease, vitamin deficiencies and vices occupy shorter sections and there is a useful section devoted to technical procedures such as inoculation, treatment of fractures, narcosis and a variety of operations. At the end of the book references to published work in the world literature are listed under the various sections and are mainly to articles published during the last few years.

Newcastle disease (in most parts of the text designated New-Castle disease !) receives very full consideration, as also do all the other virus diseases and C.R.D. This is, in fact, a well balanced book, well written and produced, and right up to date. For those who read German it can be strongly recommended.

Recent Progress in Endocrinology of Reproduction. Edited by CHARLES W. LLOYD (1959). Academic Press Inc., New York and London. $12.00

In June 1958 the State University of New York, Upstate Medical Center Dedication Year Conference was held to review the recent progress in the endocrinology of reproduction. Progress in this aspect of reproduction has made many advances in recent years so it is appropriate that the proceedings of this conference should be published in a composite form in this book.

Both the papers and the discussions have been edited by Lloyd practically unchanged. While this gives the reader an unbiased view of the deliberations of those present, it makes the book rather long (532 pages). Altogether 24 papers were read to the conference. These have been planned so that the sequence of events is developed logically. Ovulation and testicular function are first of all considered followed by the stages which lead up to fertilisation, implantation, parturition and finally lactation.

These papers have been written by authors who range from human clinicians to neurologists and biochemists. In general they have reviewed the progress in their particular subject before describing their own experimental work. An index of authors references and subject matter has been compiled by the editor, which enhances its value as a reference book.

From the veterinarian's point of view there is comparatively little experimental data regarding the domestic animal. Much of the experimental work described was carried out in the cat and rabbit but considerable space is also devoted to clinical observations in the human subject.

It would have been pleasant to see a little more about the part nutritional factors play in reproduction. The effect of the dietary protein level was considered but no mention was made of minerals, such as iodine and its relation with the thyroid. However, this book has incorporated most of the recent progress in the endocrinology of reproduction in a lucid and comprehensive manner and will form a valuable addition to the library of the worker specialising in the field of reproduction who wants to keep abreast with modern developments.

The Aetiology of Infective Diseases : with Special Reference to the Subsidiary and Important Non-specific Factors. By REGINALD LOVELL (1958). Angus & Robertson Ltd., London. 27s. 6d.

During 1955 Professor Lovell gave a series of lectures as visiting professor at Michigan State University, and his book is the outcome of this series. For so small a volume it contains a surprising amount of factual information, but its chief quality lies in that particular, mellowed brand of scientific philosophy for which the author is held in such esteem by his colleagues and generations of students alike. The first part contains a general discussion of the concepts of microbial pathogenicity, disease resistance and the host-parasite relationship ; the second is concerned with the subsidiary factors involved in infectious disease. These are difficult topics, but the condensed style and liberal use of examples make them appear simple ; where nothing is known, the author, unabashed, says so.

Now, 130 pages may be all very well as an appetizer, but having so easily been given a taste for the subject the reader is perhaps entitled to ask : when are we to expect a full-length work from this the doyen of our veterinary bacteriologists ?

Current Virus Research. *British Medical Bulletin* (1959). **15.** 175-245.

The past decade has been described as the golden age of virology and the appearance of a host of new, if sometimes ill-chosen, names—enteroviruses, adenoviruses, myxoviruses and arborviruses—is indicative of the progress made. An embarrassingly large number of "new" viruses, a number which is increasing almost month by month, has been isolated from man. Whereas it was customary for a disease entity to be described before the isolation and characterisation of its causal agent, in many instances this sequence of events has now been reversed. Many of the recent advances in this rapidly expanding field are described in a series of papers in the most recent issue of the *British Medical Bulletin*. With one exception these papers are packed with clearly presented information and make exciting reading for anyone interested in the study of infectious diseases.

The advances described have resulted almost entirely from the development of new techniques, particularly tissue-culture methods (Westwood, 1959). The great impetus for these came from the discovery that the virus of human poliomyelitis would grow in cultures of non-neural tissues of both human and monkey origin. This showed the way to providing cheap laboratory hosts for a variety of viruses. The use of continuously cultivable cell lines has led to further simplification. Tissue culture methods have not only had applications in diagnostic and epidemiological work but have permitted the mass propagation of poliovirus for vaccine production. Perhaps even more striking has been the isolation of numerous viruses whose existence was previously unsuspected, for example those of the ECHO and adenovirus groups. Apart from their obvious practical applications, tissue culture techniques have also made possible far-reaching, fundamental studies on the biology of the host-parasite relationship.

Remarkable developments have taken place in the study of virus multiplication (Tyrrell & Klemperer, 1959), involving the use of cytochemical and cytological techniques, electron microscopy, radioisotopes and fluorescent antibody techniques for the "staining" of antigens by means of antibody coupled to a fluorescent dye. This last technique can, with suitable modifications, also be used for serological studies (Belyavin, 1959). Another serological technique now being applied successfully to virology is flocculation, particularly gel-diffusion precipitation. In its most commonly used form antibody and antigen are allowed to diffuse towards each other from suitably spaced cups in an agar layer. The method has both diagnostic and analytical applications.

Some of the most spectacular advances have been made in the study of enteroviruses (Macrae, 1959), which primarily inhabit the intestinal tract. In man there are at least 57 serologically distinct enteroviruses which include the 3 polioviruses, 30 Coxsackie viruses and 24 ECHO viruses. With the exception of some Coxsackie types, enteroviruses induce cell degeneration in tissue cultures, particularly in cultures of monkey kidney cells; in fact the ECHO viruses owe their discovery to the use of tissue culture techniques. The enteroviruses have been associated with the variety of illnesses ranging from poliomyelitis to aseptic meningitis, epidemic pleurodynia, summer diarrhoea, myocarditis, and mild respiratory infections.

In the study of respiratory diseases there has also been great progress, but nevertheless some of the older problems still defy solution. A new group of agents, the adenovirus group (Pereira, 1959), has been discovered by tissue culture techniques and to date 18 serological types have been recovered from man. Adenoviruses are associated with respiratory syndromes ranging from keratoconjunctivitis to acute respiratory infections. Nevertheless the most important mild respiratory infection, namely the common cold (Andrewes, 1959), still defies elucidation. There is good evidence that a virus or viruses are involved, but beyond this little is yet known.

Several of the "new" viruses belong to the myxovirus group which includes the viruses of influenza, mumps and Newcastle disease. But even in the case of influenza, the "type" virus, many problems remain unsolved although 26 years have elapsed since the isolation of the virus. Comparatively little could be done to stop the spread of the Asian 'flu epidemic 1957-58 (Stuart-Harris, 1959), and it was fortunate that this epidemic was not as lethal as that of 1919.

The Asian 'flu epidemic did permit many epidemiological studies to be made. Equally important epidemiological studies were made on the myxomatosis epidemics in Australia and Europe (Fenner, 1959). These have been described as the most interesting large-scale epidemiological experiments in history.

Another major group of viruses affecting man comprises the arthropod-borne viruses (arboviruses) (Gordon Smith, 1959) which are wholly or mainly transmitted biologically through the infection of the salivary glands of arthropods. They are mainly distributed in tropical and sub-tropical areas and have a highly complicated ecology. Already 79 types are recognised but there are important gaps in the knowledge of their ecology, epidemiology and evolution.

A further important development in virology has been the cultivation of measles virus in monkey kidney cells (McCarthy, 1959). In the paper on measles some consideration has been given to the relationship of measles virus to that of dog distemper, but no mention is made of the possible relationships of measles and canine distemper to rinderpest.

Studies of a more fundamental nature have been made in the new field of virus genetics (Burnet, 1959) while biochemical studies are becoming increasingly important. The discovery that the ribonucleic acid of some viruses is infective by itself is of considerable biological significance.

But perhaps the most exciting discovery of all is that virus interference may be mediated through a substance, probably a protein, named interferon (Isaacs, 1959). This protein substance can prevent virus infection in the absence of antibody reactions and the hope is that it might lead to the development

(*Continued at foot of col.* 1, *page* 895)

The Victoria Veterinary Benevolent Fund

A meeting of the Council of the Victoria Veterinary Benevolent Fund was held at 10 Red Lion Square, W.C.1, on October 22nd, when the following members were present :

Mr. H. W. Dawes (President) in the chair, Mr. E. P. Barrett, Prof. T. J. Bosworth, Messrs. H. E. Bywater, E. Clark, Major J. J. Dunlop, Mrs. M. Field, Mr. R. C. U. Fisher, Mrs. D. I. Glover, Mr. A. A. Lamont, Profs. R. Lovell, J. McCunn, Mr. D. H. L. Madden, Miss V. Tillemont-Thomason, Messrs. W. Watt, E. Wilkinson and Major W. H. Wortley.

Welcome to New Member. Before proceeding with the business on the agenda, the President, on behalf of the meeting, extended a very warm welcome to Mrs. M. Field, secretary, V.V.B.F. Ladies' Guild, who had been elected by the Guild to serve on the Council for the ensuing year.

Minutes. The minutes of the previous meeting held on July 15th, having been published in THE VETERINARY RECORD, were taken as read and signed as correct.

Apologies for Absence. The secretary reported that apologies for absence had been received from Messrs. G. Atkinson, J. A. Flynn, Prof. C. Formston, Dr. R. E. Glover, Messrs. G. N. Gould, J. M. Ingram, Profs. H. G. Lamont, A. A. Messervy, L. P. Pugh, Messrs. J. N. Ritchie, W. J. B. Robson, Arnold Spicer, R. V. Thatcher, Major C. W. Townsend, Prof. W. L. Weipers, Capt. A. Whicher, Mr. H. M. Wilson and Dr. W. R. Wooldridge.

Correspondence. The secretary submitted the following communications :—

(*a*) A letter dated September 9th, 1959, from Mrs. D. I. Glover, treasurer of the Ladies' Guild, stating that at its recent annual general meeting the members had voted the sum of £1,000 for current relief, and £300 for the special gift account.

The Council, having expressed its gratification at this splendid news, then unanimously resolved that a letter be sent to Mrs. Glover asking her to accept and to convey to the members of the Guild the Council's warm thanks and appreciation for their great efforts during the year.

(*b*) Resignation of Mr. L. E. Hughes, representative of the South Wales Division, B.V.A., as he is no longer resident in South Wales.

(*c*) A letter from Dr. J. K. Walley, hon. treasurer, National Veterinary Benevolent and Mutual Defence Society, dated July 21st, 1959, advising the Council of the Society's ability to accept additions to the grants made from its benevolent fund, and asking whether the V.V.B.F. had any cases which it might wish Dr. Walley's society to take over.

The Council greatly appreciated this kind offer, and instructed the secretary as to the reply to be sent to Dr. Walley.

(*d*) Regarding the James Harrison bequest (land at Ditchling). Correspondence between Messrs. R. H. & R. W. Clutton, chartered surveyors, and the secretary, since the last meeting, including a letter which had been circulated to the members.

In view of the contents of this letter (October 10th, 1959) the secretary was directed to write to Messrs. Tomkins & Howes, solicitors, for further particulars, including the date of the tenancy agreement ; and to inform them of the decision arrived at by the Council respecting the disposal of the land.

(*e*) An application dated August 19th, 1959, from Messrs. Wilkinson, Chater & Co., Chartered Accountants, for an increase in their audit and accountancy fee to 30 guineas.

It was Resolved—That having regard to the reasons put forward by Messrs. Wilkinson, Chater & Co. the audit fee be increased to 30 guineas, to take effect at the next audit.

Accountant's Report. The following report was read and approved, a vote of thanks being accorded to the respective donors :—

Since the previous Council Meeting the following special subscription and donations had been received :

(*Continued at foot of page* 896)

Current Literature.—*Concluded.*

of a much-needed, but hitherto elusive, chemotherapeutic agent against virus infections.

The review in the *British Medical Bulletin* is virtually confined to human virology. The applications of the new techniques to veterinary virology are still in their infancy. Even so, tissue culture techniques have led to the production of an attenuated vaccine against canine hepatitis and the production of an experimental formalinised vaccine against Teschen disease, while enteroviruses comparable to those of man have been found in pigs and cattle. Fluorescent antibody studies have done much to elucidate the pathogenesis of canine distemper while the gel-diffusion precipitin reaction is being used routinely as an aid to the diagnosis of swine fever. Clearly then, there is an enormous field to explore and, if progress in the field of human virology is any guide, considerable advances in this branch of veterinary science are to be confidently expected in the course of the next few years.

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News and Comment

BRIGADIER ALEXANDER GAIRDNER RALSTON

Brigadier A. G. Heveningham writes:—

It was with a feeling of deep personal loss that I read of the sudden death of my very old friend, brother officer and colleague on November 11th, 1959.

Alec, as he was known to his many friends was born in Sunderland, Co. Durham, of Scottish parents on January 21st, 1904, and educated at the Glasgow High School. After graduating from the Royal (Dick) Veterinary College, Edinburgh, he was commissioned into the Royal Army Veterinary Corps on September 16th, 1926. A keen rugger man he was a member of the college first XV for 3 years and secretary of the club during 1925/26. As a member of the college Officers' Training Corps he became very interested in equitation, and later as a subaltern in the Corps rode second on "John Silver" to the late "Mouse" Townsend on "Travel On" in the Corps point-to-point at Liss, Hants, in 1928.

In 1929 he proceeded to India. Whilst there he rode and trained several winners on the flat, including "Brimstone," a troop horse purchased from the ranks, which won 9 races out of 11 starts.

He well realised the gravity of what proved to be his last illness but never gave in, and was rewarded with the knowledge that his work had not been altogether in vain. Undoubtedly the continual strain attendant upon the reorganisation of the peace time Army and its threat to the existence of the Corps undermined his general health but never on any occasion did I hear him complain; he was always cheerful, and there was always a silver lining to every cloud.

Victoria Veterinary Benevolent Fund—*Concluded.*

	£	s.	d.	£	s.	d.
Subscription						
V.V.B.F. Ladies' Guild				1,000	0	0
Donations						
In Memory of Mr. J. A. Matheson (J. Donald, W. G. Jones, J. T. Morton, N. Spence, T. B. Yarrow)	18	6	0			
British Timken Show	1	1	0			
Cameron, R. S.		10	0			
Langstone and District Canine Show	1	1	0			
Lincs. and District Division ...	10	0	0			
London Fox Terrier Club... ...	1	10	0			
Society of Practising Veterinary Surgeons	20	0	0			
Society of Women Veterinary Surgeons	5	5	0			
S. Wales Division—Annual Dance	19	10	6			
Whicher, A.		10	6			
Windsor Championship Show ...	10	10	0			
Collecting Boxes						
Ayrshire Veterinary Association ...	3	0	0			
Central Veterinary Society ...	2	13	10			
J. W. Holmes and W. B. Faull ...	2	10	0			
				96	7	10
				£1,096	7	10

Summer Gifts. The secretary reported that the executive committee, with the assistance of the treasurer of the Ladies' Guild, had agreed on special gifts, amounting to £284, being allocated to 36 recipients of the Fund, and that these gifts were despatched on June 30th last.

On the motion of Mr. H. E. Bywater, seconded by Mr. E. Clark, *it was resolved* that the action of the executive committee in sending out these gifts be approved.

Cases

No. 132, member, invalid. Three children, all married, and unable to help.

No. 200, daughter of late member, aged 63.

No. 265, widow, aged 69. Son, aged 32; daughter, aged 38, who contributes towards the home.

No. 305, widow, aged 62. Two sons and 3 daughters, all married, except youngest son, aged 33, for whom mother keeps house.

With regard to the above cases, which had been visited since the previous meeting, the Council decided that the grants made to these recipients be not disturbed.

No. 254, M.R.C.V.S., aged 57. Two sons and 3 daughters, all over 21 years. In-patient, Royal National Sanatorium, Ventnor. The executive committee reported that in August an application had been received on behalf of this member for a small grant to provide him with some extra comforts from time to time, and that the sum of £10 had been sent to the medical superintendent, who undertook to act as almoner.

It was unanimously agreed that the action of the executive committee be approved.

No. 288, widow, aged 78. The secretary reported that this recipient died on July 17th last.

No. 295, widow, aged 44. One daughter, aged 9, now at the Caledonian Schools, Bushey. The secretary brought this case up as it was due for review.

It was resolved that as this recipient had not completed the fresh application form sent to her by the secretary, the grant be discontinued at the end of the year, but that the case be further considered at the next meeting if she renews her application.

No. 317, son of late member, aged 64, married, partially blind. Asks for temporary help until he becomes eligible for the N.I. pension in August, 1960. It was agreed to make a special grant in this case.

No. 320, widow, receiving a grant of £2 p.w. As this recipient was now receiving a reversionary benefit under a will, *it was resolved* that the grant be discontinued at the end of the year.

No. 321, M.R.C.V.S., aged 88. The secretary reported that this recipient died on September 21st, 1959.

No. 324, widow, aged 66. The secretary, having submitted this case for review, *it was resolved* that a grant of £2 p.w. be made to this recipient for the ensuing year.

No. 325, widow, aged 54. Three sons, aged 20 (articled pupil), 27 and 31, married, and unable to help.

As the youngest son had now obtained employment with a firm of auctioneers and surveyors, *it was resolved* that the grant in this case be discontinued at the end of the year.

No. 332, widow, aged 66. Reports from a Member of Council who visited this case on August 14th, and the executive committee, were submitted and considered. *It was resolved* that a grant of £1 p.w. be made to this applicant for the next 6 months when the case be reviewed in the light of a report on a further interview with this recipient.

No. 333, widow, aged 35. Four children between the ages of 4½ and 9½. In view of her present financial position and the recommendation of the Irish scrutinising committee, which accompanied the application, *it was resolved* that no grant be made in this case.

Date of Next Meeting. It was agreed that the date of the next meeting be left in the hands of the executive committee.

It was hoped that on retirement, and having devoted nursing and care of a loving wife he would have been spared to enjoy many years at his home in Farnborough, which he loved so much. This was not to be, and on November 11th, a fine officer and gentleman, admired and respected by all, passed to his final rest. *Requescat in pace.*

To his sorrowing widow and daughter we extend our heartful sympathy and pray that God may give them strength to bear the heavy cross so suddenly laid upon them.

ERADICATION OF RINDERPEST IN EASTERN AFRICA

A meeting of veterinary administrators in Eastern Africa was held recently in Nairobi under the auspices of CCTA. In attendance were representatives from Kenya, Tanganyika, Uganda, Somaliland, Somalia, EAVRO, FAO and IBED. Territorial policies with regard to the eradication of rinderpest were discussed and the present geographical distribution and epizootiology of rinderpest in eastern Africa was reviewed. Rinderpest has been eradicated from eastern Africa except for Karamoja in the north-east corner of Uganda, the northern frontier province of Kenya, the north-west of Somalia, the southern Sudan and Ethiopia. In addition, the disease is apparently enzootic in game in Kenya Masailand and the contiguous part of Tanganyika Masailand.

PERSONAL

Professor E. G. Cox, T.D., D.SC., F.INST.P., F.R.I.C., F.R.S., Professor of Inorganic and Structural Chemistry in the University of Leeds, is to succeed Sir William Slater, K.B.E., D.SC., F.R.I.C., F.R.S., as secretary of the Agricultural Research Council on Sir William's retirement next year. Professor Cox's appointment will take effect from July 1st, 1960.

Dr. Joseph Edwards has been awarded the Thomas Baxter prize for outstanding achievement in the service of the dairy industry. The award was made for administrative educational and advisory work. Dr. Edwards is, of course, scientific adviser and head of the Production Division of the Milk Marketing Board.

Mr. I. McLachlan, veterinary officer, who was stationed at Oban, has resigned.

Mr. G. N. Gould has been elected President of the New Forest Agricultural Show Society. He succeeds Sir John Mills.

Births

BECK.—On November 5th, 1959, to Shena, wife of Robert Beck, M.R.C.V.S., at Crossapol, Isle of Tiree, a son, Andrew James.

CLAYDON.—On November 24th, 1959, at "Melrose," Okehampton, to Gillian, wife of Roy Claydon, M.R.C.V.S., a daughter, Lindsay Kathryn, sister for Deborah and Stephanie.

MORING.—On November 12th, 1959, at the Marymount Maternity Home, Johannesburg, S. Africa, to Joan (*née* Tickton), wife of Basil Moring, B.SC., M.R.C.V.S., Capt. late R.A.V.C., of 119 Louis Botha Avenue, Orange Grove, Johannesburg, a son, Charles Leonard Michael.

ERRATUM

The authors of the paper "Parenteral Administration of Copper Compounds to Cattle with Special Reference to Copper Glycine (Copper Aminoacetate)" published in THE VETERINARY RECORD of November 7th, 1959, have asked us to publish the following amendment:—

Page 799, second column, line 4. For 7.85 g. $CuSO_4 \cdot 5H_2O$ read 3·93 g. $CuSO_4 \cdot 5H_2O$.

COMING EVENTS

December

6th (Sun.). Meeting of the Kenya Veterinary Association at Uplands Bacon Factory and Sports Club, 11 a.m.

9th (Wed.). Meeting of the Southern Counties Veterinary Society at the Conference Room, Civic Centre, Southampton, 7.30 p.m.

Joint Meeting of the Society of Practising Veterinary Surgeons and the Warwickshire Veterinary Club at the Regent Hotel, Leamington Spa, 7.30 p.m.

Meeting of the Lincolnshire and District Division at the Grand Hotel, Peterborough, 2.15 p.m.

Evening meeting of the Dumfries and Galloway Division in Dumfries.

10th (Thurs.). Meeting of the Essex Veterinary Society at the Essex Institute of Agriculture, Writtle, Essex, 7.30 p.m.

Meeting of the East Midlands Division at the University School of Agriculture, Sutton Bonington 4.15 p.m.

11th (Fri.). 11th Meeting of the British Veterinary Poultry Association at Unilever House, London, 2.15 p.m.

Meeting of the Midland Counties Veterinary Association at the V.I.O. Centre, "Woodthorne," Wolverhampton, 7.30 p.m.

16th (Wed.). Meeting of the Sussex Veterinary Society at the Old Ship Hotel, Brighton, 2.30 p.m.

17th (Thurs.). Meeting of the South Eastern Veterinary Association at the Royal Star Hotel, Maidstone. 2.30 p.m.

Joint Meeting of the Society of Practising Veterinary Surgeons and the Western Counties Veterinary Association at the Rougemont Hotel, Exeter, 2.30 p.m.

18th (Fri.). Winter Meeting of the North of England Veterinary Medical Association in the Agricultural Lecture Room, King's College, Newcastle-upon-Tyne, 1, 2.30 p.m.

January, 1960

13th (Wed.) Meeting of the Southern Counties Veterinary Society at the Royal Hotel, Winchester.

20th, 21st and 22nd (Wed., Thurs. and Fri.). B.V.A. Committee and Council Meetings in London.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Foot-and-Mouth Disease

Yorks. Temple House Farm, Woodlesford, Leeds (Nov. 24).

Anthrax

Bute. Home Farm, Brodick, Isle of Arran (Nov. 30).
Ches. Chorley Stock Farm, Nantwich (Nov. 26).
Dumfries. Upper Minnygap Farm, St. Ann's, Lockerbie (Nov. 24).
Norfolk. Quidney Farm, Ashill, Thetford (Nov. 30).
Staffs. Woodfields Farm, Netherseal, Burton-on-Trent (Nov. 26).
Sussex. Park Farm, Aldingbourne, Chichester (Nov. 26).

Fowl Pest

Beds. Top Farm, Wyboston (Nov. 24).
Berks. Upper Lodge, Padworth, Reading (Nov. 24); Home Farm, Padworth, Reading (Nov. 25); Stable Cottage, Padworth House, Padworth, Reading (Nov. 27).
Bucks. The Allotments, West End, Weston Turville, Aylesbury; Walnut Cottage, Moor End, Weston Turville, Aylesbury (Nov. 25); 45, Walton Place, Weston Turville, Aylesbury; Old Mill House, Broughton Aylesbury (Nov. 28); 25, Brook End, Weston Turville, Aylesbury (Nov. 30).
Cambs. 53, Highfield Road, March; 90, Wisbech Road, March; 11, Job Street and The Orchard, March; 10, Narwclde Street, March; 14, Short Road, Stretham, Ely; The Slade, Witcham, Ely; Smallholding, Fen Road, Chesterton; Binnimoor Farm, Rodham Road, March; Dora Dene, Cambridge Road, Little Thetford, Ely; Laurel Farm, Mepal, Ely; Girton Farm, Oakington Road, Girton (Nov. 24); Harston Manor, Harston; Brangehill, Mepal, Ely; 224, High Street, Chesterton; Chesterton Fen Farm, Chesterton; Ivy House, Over; Barkers Farm, Grange Farm, Duxford; 7, School Lane, Conington; 11, School Lane, Conington; Fen Road, Old Chesterton; 94, High Street, Girton; Girton Cottage, Histon Footpath, Girton (Nov. 25); 96, High Street, Girton; 12, Church Street, Stapleford; Oak Farm, Chittering, Waterbeach; The Bungalow, School Lane, Chittering, Waterbeach; Fen Road, Chesterton; 9, Church Street, March; The Croft, High Street, Harsten; 133, Wimblington Road, March; 14, High Street, Alreth, Haddenham, Ely; Bradfield Farm, 26, High Street, Aldreth, Haddenham, Ely; The Chase, Malton Road, Meldreth, Royston (Nov. 27); Long Drove, Cottenham; 30, Gaul Road, March; Primrose Farm, Sutton Gault, Ely; 12, Green Street, Willingham; 10, George Street, Willingham; Ashcroft, Northend, Meldreth, Royston; 2, Corbett Street, Cottenham (Nov. 28); 1, Church Lane, Willingham; 15, Church Street, March; 2, High Street, Willingham; Manor Farm, Newton (Nov. 29); 24, Third Drove, Little Downham, Ely; Inshalla, Fishers Lane, Orwell, Royston; Thornhill Bungalow, Wisbech Road, March; Hillside Road, Battery House, Wisbech Road, March; Station Road, Over; Marshall House, Wisbech Road, March (Nov. 30).
Derbys. Nether House, Farm, Calow, Chesterfield (Nov. 25); Starforth Lane, Hasland (Nov. 27).
Essex. Brooklands, Stebbing Road, Felstead, Dunmow (Nov. 25); Greenacres, Harts Lane, Ardleigh, Colchester; Burnt House Farm, Stebbing Green, Dunmow; Stebbing, Dunmow (Nov. 26); Porters Hall, Stebbing, Dunmow (Nov. 27).
Glos. Priest House Farm, Bisley, Stroud (Nov. 25).
Herts. Middle Farm, Throcking, Buntingford (Nov. 30).
Hunts. Green End, St. Ives; Hill House, Chatteris Road, Warboys (Nov. 24); East Street, Colne; Crosslets, St. Audreys Road, St. Ives; 31, Great Farthing Close, St. Ives (Nov. 25); 1, Oxford Road, St. Ives; Station Road, Warboys; 27, Little Farthing Close, St. Ives; The Public Cottage, St. Ives; 48, Great Farthing Close, St. Ives; 38, Great Farthing Close, St. Ives (Nov. 26); 2, Council House, Little Stukeley (Nov. 27); 47, Old Mill Avenue, Warboys (Nov. 28); High Street, Somersham; Birds Farm, Broughton (Nov. 29).
Kent. Malthouse, Green Street Green, Dartford (Nov. 26); Lower Green Allotments, Rusthall, Tunbridge Wells (Nov. 27); Taggs Mount, Bethersden, Ashford (Nov. 28).
Lancs. Londonderry Cottage, Wigan Lane, Duxbury, Chorley (Nov. 27).
Lincs. New House Farm, Lenton, Grantham; Holmfield Farm, Blankney; Redmile, White Cross, Sutton St. James, Spalding; High Street, Caythorpe, Grantham; Church Street, Caythorpe, Grantham (Nov. 24); Station Road, Gedney Hill, Spalding (Nov. 25); Watercress Gardens, Greatford, Stamford (Nov. 27); Rose Cottage, Station Road, Gedney Hill, Spalding; Waste Green Lane, Algarkirk, Boston (Nov. 28); Station Road, Welbourn (Nov. 30).
Norfolk. Westering, Thieves Lane, Salhouse, Norwich; Mill Farm, Great Witchingham, Norwich; Breydon House, Thakenham Road, Great Witchingham, Norwich; The Bungalow, Primrose Farm, Wicklewood, Wymondham (Nov. 24); Hawks Hill Farm, Great Witchingham, Norwich; Glebe Farm, Wreningham, Norwich; Ashtree Farm, Southrepps, Norwich; Hillside Farm, Market Weston, Diss (Nov. 25); Thornage Road, Holt; Trevone, Station Road, Reepham, Norwich; 8, Denny's Walk, Narborough, King's Lynn; 204, Fakenham Road, Taverham, Norwich; Redwing Poultry Farm, Stanninghall, Crostwick, Norwich; High Breck Farm, Fir Common Road, Taverham, Norwich (Nov. 26); The Breek Farm, Stody (Nov. 27); Meadow Farm, Leatheringsett, Holt; Long Green, Diss (Nov. 28); Riverside House, Wortham, Diss; Ling Road, Farm, Wortham, Diss; Garden Cottage, Market Weston, Diss (Nov. 29); Great Hautbois House, Coltishall, Norwich; Orchard View, Whitwell Street, Reepham, Norwich; Beehive Cottage, Wortham, Diss; Field Farm, Fakenham Magna, Thetford; Field off Armstrongs Corner, Besthorpe (Nov. 30).
Notts. Grove Farm, Kinoulton; 69, Upper Dunstead Road, Langley Mill (Nov. 24); Hillside Farm, The Moor, Bilsthorpe, Newark (Nov. 25); Park House, Blythe Road, Ranskill, Retford; Springfield Farm, Knoulton (Nov. 26); 82, Upper Dunstead Road, Langley Mill; Rufford, Ollerton, Newark (Nov. 27); Redcote Farm, Bilsthorpe, Newark (Nov. 28); Home Farm, Bilsthorpe, Newark; Ivy Farm, Weston, Newark; Crifton Lodge, Bilsthorpe, Newark; Gables Farm, Bilsthorpe, Newark; Old Village, Bilsthorpe, Newark (Nov. 29); Rookswood, Bilsthorpe, Newark; Indersall Chage, Bilsthorpe, Newark (Nov. 30).
Suffolk. Brookfield, Bury Road, Stowmarket; 23, Mildenhall Road, Bury St. Edmunds; Warren Bungalow, Badwell Ash, Bury St. Edmunds; Stowupland Road, Stowmarket; Hall Farm, Swilland, Ipswich (Nov. 24); Thronbush Farm, Stonham, Stowmarket; Home Farm, Mellis, Eye; Carberry, Wattisham, Ipswich (Nov. 25); Woodhouse Farm, Rishangles, Eye; The Bungalow, Wash Lane, Mendham, Stowmarket (Nov. 26); Darsham Farm, Wetherden, Stowmarket; Rathkeltair, Farnham St. Martin, Bury St. Edmunds; Bullocks Farm, Mellis, Eye; White Gates Farm, Mellis, Eye; Ash Tree Farm, Mellis Eye; Brickyard Poultry Farm, Stowmarket (Nov. 27); Six Acre Farm, Little Blakenham, Ipswich; Pear Tree Cottage, Mellis, Eye; Mill Farm, Hengrave, Bury St. Edmunds; Manor House, Mellis, Eye; Rose Cottage, Mellis, Eye; Cranmer Lodge, Walsham-le-Willows, Bury St. Edmunds (Nov. 28); Ivydene, Bacton, Stowmarket; Upper Town Farm, Wetherden, Stowmarket; Lodge Farm, Mendelsham, Stowmarket; Allotments Near Crown Allotments, Coddenham, Ipswich; Foundry House, Thorndon, Eye (Nov. 29); The Forge, Mellis, Eye (Nov. 30).
Surrey. Towgate House, 179, Epsom Road, Merrow, Guildford (Nov. 25); Fullers Farm, East Clandon, Guildford (Nov. 27); Blake's Lane Farm, East Clandon, Guildford (Nov. 28); Four Oaks Farm, Ewhurst, Cranleigh (Nov. 30).
Sussex. Sandpit Piggeries, Statham Lane, Ditchling, Hassocks (Nov. 28).
Warwicks. 48 Arrow Road, Alcester (Nov. 26); Orchard Cottage, Long Marston, Stratford-on-Avon (Nov. 27).
Worcs. Court Farm, Broadway (Nov. 27).
Yorks. Hill Top Farm, Crab Lane, Bilton, Harrogate; Grange Mill Farm, Grange Mill Lane, Kimberworth, Rotherham; Smith Fold Farm, Wortley, Sheffield (Nov. 24); 62 Mount Road, Sheffield, 3; Parkwood Springs Piggery,

Douglas Road North, Sheffield; Lower Pickliffe Farm, Oxspring, Sheffield (Nov. 26); Townend Farm, Deepcar, Sheffield (Nov. 27); 2 Bole Road, Eckington, Sheffield (Nov. 30).

Swine Fever

Cambs. Muncey's Lane, Elm, Wisbech (Nov. 27).
Devon. The Orchard, Lower Hooacombe, Crediton, Preston Farm, Ermington, Ivybridge (Nov. 24); Lower Pilehayes Farm, Woodbury, Exeter; Underhill, Dawlish Road, Alphington, Exeter (Nov. 25); Jersey Farm, Samford Peverell, Tiverton; Mildons Leigh, Chawleigh, Chulmleigh (Nov. 26); Shortacombe Farm, Yeoford, Crediton (Nov. 30).
Herts. Leewood Farm, Hart Hall Lane, Kings Langley (Nov. 24).
Lancs. No. 3 Holding, Fallowfield Estate, Fallowfield, Manchester (Nov. 30).
Lincs. 34 Church Road, Winthorpe, Skegness (Nov. 24).
Norfolk. Bristows Farm, East Ruston, Norwich; Iona, Dereham Road, Mattishall, Dereham (Nov. 24); Home Farm, Wacton, Norwich (Nov. 25); New Barn Farm, Tunstead, Norwich (Nov. 27); Old Mill Bungalow, Poringland, Norwich (Nov. 30).
Northants. 11, Medow Road, Peakirk, Peterborough (Nov. 30).
Notts. Hill Crest Piggeries, Stanton-on-the-Wolds; Felly Priory Farm, Underwood, Nottingham (Nov. 24); Fisher Lane Slaughterhouse, Fisher Lane, Mansfield (Nov. 25).
Somerset. Fordcrossed Farm, Crewkerne (Nov. 24); Hobbs Moor Farm, Sticklepath, Combe St. Nicholas, Chard (Nov. 30).
Suffolk. Harkwick Road Allotments, Bury St. Edmunds (Nov. 27).
Surrey. Apsley Cottage, Park Road, Banstead (Nov. 25).
Yorks. 39 Winston Green, Mattersey Thorpe, Mattersey, Doncaster (Nov. 24).

THE BRITISH VETERINARY POULTRY ASSOCIATION

The next meeting of this Association will be held at 2.15 p.m. on Friday, December 11th, 1959, at Unilever House, London. Illustrated talks will be given by Drs. W. P. Blount and R. F. Gordon on their recent visits to Japan and the U.S.S.R.

Those members of the Association who have not yet done so, are asked to inform the hon. secretary, Mr. J. M. S. Lucas, of their intention to attend, and the names of their guests.

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

(Exotic) Operations on (exotic) Mammals

Sir,—Without wishing to indulge in a One-Upmanship competition I should like to make a small addition to the above subject. I feel it may give encouragement to any who may be hesitant about surgical procedures in unusual, frequently "hopeless" cases.

(1) A pet mouse had produced unaided one mousling. She was obviously carrying several more, the next being malpresented, one minute foot only showing. Moderate traction resulted in the separation of the limb so, in view of the value of the animal to the owner, caesarean operation was advised. Anaesthetised with the computed dose of pentobarbitone intraperitoneally, the mouse presented a perfect subject for a mid-line incision.

Ten more young, already dead, were removed, and both uterine and abdominal wounds were closed with about 10 noughts nylon filament, using a modified Copestake suture for the uterus which was thinner than the nylon.

Penicillin/streptomycin cerate intra-abdominally was the only antibiotic administered and the mouse made an uneventful recovery.

(2) A young adult Corgi dog was presented with the left fore-leg three-quarters severed at the shoulder as a result of a road accident. The pectoral muscles were severed, and only the great vessels and the muscles and skin of the dorsal quadrant of the attachment were left intact. The medial aspect of the humerus was exposed and the bone crushed. A stainless steel pin was cut to length, the proximal and distal portions of bone, each about ¾" in length, were impaled on the ends of the pin and the remaining 4 or 5 fragments fitted around its length. Muscles were sutured with catgut, the skin with monofilament nylon, and antibiotic cerates were applied liberally.

The limb was strapped to the chest in the flexed position with "Elastoplast," a pad of corrugated cardboard preventing excessive adduction. Penicillin and streptomycin were given systemically for a few days.

The support was renewed after a week, and then left in place for a further 7 weeks when the skin sutures were removed.

Four months after the operation the dog is walking normally, only resting the leg slightly when standing still.

I claim no credit for the surgery but do feel these two cases are typical of the reward that will often follow an attempt to do the "impossible," even with no special facilities.

Yours faithfully,
PETER COPESTAKE.

Stanley House,
Colne,
Lancashire.
November 28th, 1959.

Asphyxiation of Cattle

Sir,—Messrs. Gourlay, Nunn and Coyle are to be congratulated on their article in THE VETERINARY RECORD (**71.** 743). Deliberate asphyxiation of cattle was practised by the Wakuria cattle-owners of North Mara in the Musoma District of Tanganyika.

In August, 1946, at a wedding ceremony on the Utimbaru Escarpment, I saw two freshly-killed zebu

bullocks being distributed. There were grooves in the skin where ropes had tied the mouths shut; the nostrils were blocked with mud. The Wakuria maintained that flavour was better when the blood was left in the meat.

Yours faithfully,
IAN MACADAM.

The Federal Department of
Veterinary Research,
Vom,
Northern Nigeria,
West Africa.
November 23rd, 1959.

Massage of the Ovary

Sir,—I read Mr. J. G. Wilson's original paper "Bovine Abortion in the South West" with considerable interest. In my experience ablation or enucleation of the corpus luteum is a *very sure means* of terminating pregnancy—even at as late a period of gestation as 7 months. It will be appreciated that the record of cases so late in pregnancy is small, but is none the less convincing.

It is interesting to recall that if the records of the old Survey Committee were looked into, it would be found that the early discussions in 1939-40 on treatment of infertility were considerably delayed by the insistence of certain practising members on the need for pregnancy diagnosis as a prerequisite of clinical interference.

This opinion was based, in my own case, on experience in the years before 1939 of the treatment of infertility by simple enucleation of the corpus luteum as recommended by Dr. Hammond to secure a rapid return to oestrus—the word of the farmer having been accepted that the animal was returning regularly to service, or that the animal was in a state of anoestrus and had not been served.

From time to time I have confirmed pregnancy—both early and late—in cows and heifers reputedly non-pregnant, in which the ovary had been "massaged" in treatment, or in which there was a record of the corpus luteum having been enucleated. But examination of the ovary at the time of my pregnancy diagnosis had always shown the presence of the corpus luteum which led me to the conclusion that it had not, in fact, been enucleated, or possibly had only been partially enucleated in treatment.

It is quite possible to carry out a *partial enucleation* of a corpus luteum in the belief that the whole has been removed from the ovary.

It would be interesting to know if the work of McDonald, Nichols and McNutt, quoted by Mr. Wilson, has been confirmed by other workers, and it might be of interest to know the base in which the 100 mg. daily dose of progesterone given from the 60th to the 162nd day was contained, how it was injected, and the rate of absorption.

Short's work which has been quoted, although interesting, does not in my opinion confirm the findings of McDonald, Nichols and McNutt.

Yours faithfully,
G. N. GOULD.

12 Landguard Road,
Southampton.
November 30th, 1959.

Castration with Rubber Ring

Sir,—We are anxious to assess the humaneness or inhumaneness of the rubber ring method of castrating stock but have encountered differing opinions on the subject. We should be most grateful to learn from any of your readers of experiences which might point to a definite conclusion. To what extent does the effect on the animal depend on such things as age, breed, size, conformation of the parts, or general condition? What criteria are appropriate for judging whether pain is experienced and if so for how long and with what intensity? We should indeed be grateful to any reader of THE RECORD for information which might help towards a conclusion that can be recommended with confidence.

Yours faithfully,
C. W. HUME.
Secretary General of UFAW
The Universities Federation for Animal Welfare,
7a Lambs' Conduit Passage,
London, W.C.1.
December 1st, 1959.

ADVERTISER'S ANNOUNCEMENT

GLAXO LABORATORIES LTD. announce that Copper '45' Injection for sheep is now available in a new single dose cartridge presentation. This is for use with a standard medical and dental cartridge syringe and will be packed in cartons of 10 x 1 ml. cartridges.

This injection provides a safe and economical means of treating copper deficiency in sheep. One dose contains 45 mg. of copper (as 150 mg. copper glycine) and this should be given to each ewe about mid-pregnancy.

The following packs are also available on the Home Market: Veterinary Mylipen 90 ml. bottle; Veterinary Stabilised Injection of Dimycin 90 ml. bottle.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
16th to 31st Oct., 1959		12	—	—	118	—	75
Corresponding period in	1958	5	—	1	33	—	43
	1957	7	—	23	76	—	45
	1956	22	1	1	46	—	20
1st January to 31st Oct., 1959		208	2	9	728	—	1,058
Corresponding period in	1958	137	5	116	617	—	1,069
	1957	277	7	117	744	—	809
	1956	1,183	11	128	603	—	650